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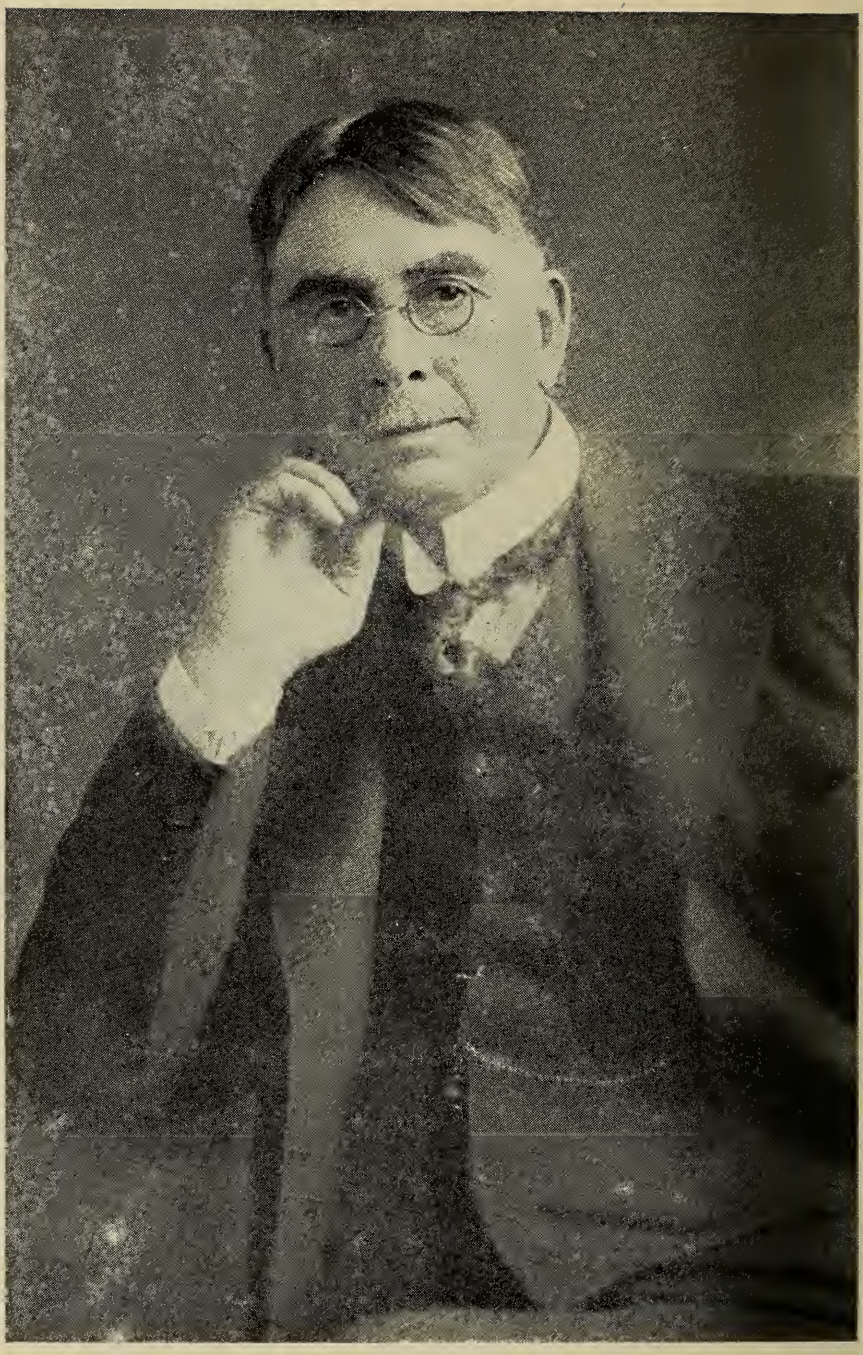

LEONARD FREEMAN
President 1917

CAT.

TWENTY-SEVENTH ANNUAL MEETING

TRANSACTIONS

OF THE

WESTERN SURGICAL ASSOCIATION

Twenty-Seventh Annual Meeting

St. Paul, Minnesota, December 16 and 17, 1917

MINNEAPOLIS
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EX-PRESIDENTS AND MEETING PLACES

PRESIDENT	PLACE	YEAR
S. S. Todd*	Topeka	1891
Milo B. Ward*	Kansas City	1892
Milo B. Ward*	Des Moines	1893
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John E. Summers, Jr.	Kansas City	1895
Thomas J. Beattie	Topeka	1896
Joseph Eastman*	Denver	1897
David S. Fairchild	Omaha	1898
Homer C. Crowell	Des Moines	1899
O. Beverly Campbell	Minneapolis	1900
August F. Jonas	Chicago	1901
James E. Moore	St. Joseph	1902
Alex. Hugh Ferguson*	Denver	1903
Charles H. Mayo	Milwaukee	1904
Harvey D. Niles*	Kansas City	1905
Malcolm L. Harris	Salt Lake City	1906
Charles W. Oviatt*	St. Louis	1907
William W. Grant	Minneapolis	1908
Arthur L. Wright*	Omaha	1909
John P. Lord	Chicago	1910
Amos W. Abbott	Kansas City	1911
Lewis L. McArthur	Cincinnati	1912
Jabez N. Jackson	St. Louis	1913
Byron B. Davis	Denver	1914
Joseph Rilus Eastman	Des Moines	1915
Lawrence W. Littig*	St. Paul	1916
Leonard Freeman	Omaha	1917

*Deceased.

The Western Surgical Association does not hold itself responsible for, or necessarily endorse, any of the papers printed herein.

ARTHUR T. MANN, Secretary-Treasurer.

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Executive Session

Transactions of the Twenty-seventh Annual Meeting of the W. S. A.

December 14, 1917—First Day—Morning Session

The Association met in Hotel Fontenelle, Omaha, Neb., and was called to order at 10:40 A. M. by the President, Dr. Leonard Freeman, of Denver, Colorado.

Dr. B. B. Davis, Chairman of the local Committee of Arrangements, stated that the Omaha and Douglas County Medical Society had arranged for a luncheon at the hotel at 12:30, that the annual dinner would be held in the hotel at 7 P. M., and after the dinner the address of President Freeman would be delivered, followed by a talk on "Experiences in War Surgery in Austria," by Dr. Joseph Rilus Eastman, Indianapolis, Indiana.

Tomorrow (Saturday) arrangements have been made with the University Medical School for the members to attend a buffet luncheon at the University Hospital, after which they would inspect the hospital and its equipment, returning to the hotel for the afternoon session.

Dr. B. Merrill Ricketts, of Cincinnati, read a paper entitled "Multiple Anastomosis for Intestinal Stasis and Obstruction Due to Any Cause," which was dis-

cussed by Drs. Eastman, Jackson, and, in closing, by the essayist.

Dr. Daniel N. Eisendrath, of Chicago, and Dr. H. C. Dunlavy, of Chicago, contributed a joint paper entitled "The Fate of the Cystic Duct after Cholecystectomy." This paper was discussed by Drs. Davis, Mann, Dennis, Byford, Vaughan, Ricketts, and, in closing, by Dr. Eisendrath.

Dr. N. J. MacLean, of Winnipeg, Manitoba, read a paper entitled "The Pendulous Abdomen." The paper was discussed by Drs. Beck, Hertzler, Benjamin, and, in closing, by the essayist.

On motion, the Association adjourned until 2 P. M.

First Day—Afternoon Session

The Association reassembled at 2 P. M., and was called to order by the President.

Dr. Roger T. Vaughan, of Chicago, read a paper entitled "The Spontaneous Rupture of Ventral Hernial Scars with Visceral Protrusion," which was discussed by Drs. Hill and Sala.

Dr. E. M. Sanders, of Nashville, Tenn., read a paper entitled "The Management of Cases with Ruptured Appendix."

Dr. Archibald MacLaren, of St. Paul, Minn., followed with a paper entitled "The Closure of Fecal Fistulæ." The paper of Dr. Sanders was then discussed in connection with the paper of Dr. MacLaren by Drs. Collins, Abbott, Eisendrath, Jackson, Evans, Wallace, Percy, and Ricketts, and the discussion was closed by Dr. MacLaren.

Dr. Frederick G. Dyas, of Chicago, read a paper on "Local Anesthesia in Major Surgery," which was discussed by Drs. Vaughan, Harsha, MacLaren, Farr, Eastman, Hare, Ricketts, and Dennis, and the discussion was closed by the essayist.

Dr. Jabez N. Jackson, of Kansas City, gave a talk on the war, and pointed out the importance of physicians joining the Medical Reserve Corps.

At the conclusion of Dr. Jackson's remarks, President Freeman said: "This war talk was suggested by the Council of National Defense, and Major Jump promised to send some one to give the talk, but I am glad he did not do so, because I do not believe any man that Major Jump might have sent could have made a better speech on this subject than Dr. Jackson has done, and, personally, I want to thank him for his remarks."

This subject is not open for discussion.

Mr. Frank R. Vanderlip, of New York City, addressed the Association on liberty loans, the conservation of food, and the necessity of men, women, and children doing their bit in the great crisis that confronts the nation.

Dr. R. W. Corwin, of Pueblo, read a paper entitled "The Conduction of Hospitals," which was discussed by Drs. Kreider, Dennis, Percy, and, in closing, by the essayist.

Dr. Emil G. Beck, of Chicago, read a paper entitled "The Sutureless Skin-sliding Method for Radical Treatment of Lung Abscesses and Chronic Osteomyelitis." The paper was discussed by Drs. Fairchild, Evans, Lemon, and Benjamin, and the discussion was closed by the essayist.

Dr. Dean Lewis, of Chicago, read a paper entitled

"Paget's Disease of the Skull," which was discussed by Drs. Eisendrath, Vaughan, and Beck, and the discussion was closed by the essayist.

On motion the Association adjourned until 8 P. M.

First Day—Evening Session

At this session (the annual dinner), Dr. A. F. Jonas, of Omaha, acted as toastmaster. The President, Dr. Leonard Freeman, of Denver, Colo., was introduced and delivered his address.

Dr. Joseph Rilus Eastman, of Indianapolis, Ind., followed with "Experiences in War Surgery in Austria."

Adjourned.

December 15—Second Day—Morning Session

The Association met at 9 A. M. and was called to order by the President.

Dr. George N. Kreider, of Springfield, read a paper entitled "The Cause and Prevention of Gastroptosis and Its Treatment by the Rovsing Operation," which was discussed by Drs. Collins, Sala, Warren, and Beck, and the discussion was closed by the essayist.

Dr. Carl E. Black, of Jacksonville, read a paper entitled "Gunshot of the Spine, with Report of a Case."

Dr. E. M. Sala, Rock Island, read a paper entitled "Rest and Open Operation in Joint Injuries," which was discussed by Drs. Eisendrath, Eastman, Mann,

Lemon, Fairchild, and Farr, after which the discussion was closed by the essayist.

Dr. Clifford U. Collins, Peoria, Illinois, read a paper entitled, "A New Operation for Complete Prolapse of the Uterus." The paper was discussed by Drs. Kreider, Ricketts, Benjamin, Byford, and Freeman, and the discussion was closed by the essayist.

Dr. A. W. Abbott, of Minneapolis, read a paper entitled "Artificial Vagina." The paper was discussed by Drs. Beck, Byford, Farr, and, in closing, by the essayist.

Dr. T. F. Riggs, of Pierre, read a paper entitled "Epithelioma Involving the Axilla."

Dr. William M. Harsha, Chicago, read a paper entitled "Carcinomatous Mastitis, with Report of a Case."

These two papers were discussed together by Drs. Eisendrath, Abbott, and Brockman, and the discussion was closed by Dr. Riggs.

On motion, the Association adjourned until 2 P. M.

Second Day—Afternoon Session

The Association reassembled at 2 P. M., and was called to order by the President.

Dr. G. G. Cottam, of Sioux Falls, read a paper entitled "Compound Traumatic Separation of the Lower Epiphysis of the Femur," which was discussed by Dr. Summers, and the discussion was closed by the essayist.

Dr. F. G. Nifong, of Columbia, read a paper entitled "A Plea for the Renaissance of the Hodgen

Splint," which was discussed by Drs. Sanders, Corwin, Eastman, and Eisendrath, and the discussion was closed by the essayist.

Dr. E. Starr Judd, of Rochester, Minn., read a paper on "Supernumerary and Single Ureters Opening Extravesically." The paper was discussed by Dr. Henderson.

The President: At this time we will listen to the report of the Council by the Secretary-Treasurer, Dr. Mann.

The Secretary-Treasurer Presented the following report:

Report of the Executive Council

December 15, 1917.

There were present at the meetings of the Executive Council Drs. Littig, Freeman, Jackson, Eastman, Fairchild, and Mann.

The following are recommended as nominees for the Board of Governors of the American College of Surgeons:

Richard W. Corwin, Pueblo, Colo.
Joseph Rilus Eastman, Indianapolis, Ind.
Byron B. Davis, Omaha, Neb.

The following are recommended as officers for the coming year:

President, James F. Percy, Galesburg, Ill.
First Vice-President, Daniel N. Eisendrath, Chicago, Ill.
Second Vice-President, D. C. Brockman, Ottumwa, Ia.
Secretary-Treasurer, Arthur T. Mann, Minneapolis.

Our membership is full, and it was deemed best not to increase the membership this year during the stress of war in order to make room for new members.

The following are recommended for the Executive Council:

Roland Hill, St. Louis.
Charles D. Lockwood, Pasadena.

The Treasurer's report was approved and is as follows:

TREASURER'S REPORT

Receipts

Balance on hand December 15, 1916	$26.10
One Volume Transactions	2.50
Fees and dues to December, 1917	1,430.00
Guest tickets to banquet	40.00
	$1,498.60

Disbursements

Paid for projection lantern	$5.00
Paid for reporting the St. Paul meeting	147.46
Paid for printing	53.00
Paid for 250 Volumes of Transactions ($982.00)	Not paid
Honorarium to secretary	100.00
Postage, express, etc.	19.45
Badges	30.38
Banquet at Omaha	252.00
Moving-picture reels	25.00
Moving-picture machine	12.50
Balance on hand	853.81
Total	$1,498.60

It is recommended that the annual dues be entirely remitted for those on active service in the Medical Corps during the time of such service, and the dues of the remaining members be made elastic during this period, and made sufficient to cover whatever this makes necessary.

As the place of meeting next year, subject to change in accordance with the exigencies of the war, San Antonio, Texas, is recommended, and the date, Monday and Tuesday, December 16 and 17, 1918.

The President: You have heard the report of the Executive Council; it is now before you for action.

Dr. A. F. Jonas: I move that the report be adopted as read.

Seconded and carried.

Dr. L. W. Littig: I move that a rising vote of thanks be extended to the Omaha and Douglas County Medical Society for entertaining us at this meeting, and that our thanks be also extended to the local Committee of Arrangements, with Dr. B. B. Davis as Chairman, and to the Hotel Fontenelle for accommodation and for contributing towards the success of this meeting.

Seconded and carried.

The President appointed Dr. John E. Summers and Dr. W. A. Dennis to escort the newly elected President, Dr. James F. Percy, of Galesburg, to the platform.

In accepting the Presidency, Dr. Percy said:

Mr. President, Members of the Western Surgical Association: When I think of all the nice things I have heard from men who have been given this office in this Association in years gone by, and the delightful way they have expressed to you their appreciation of this position, I feel that anything I might say would be inadequate, untrained as I am in the delightful expression of those things that are deepest in one's heart; and yet I desire to say that this is the greatest honor that has ever come to me. If I have achieved anything in the practice of surgery it has been due more than anything else to the inspiration that I have received from this Association. When I think of the men that I have met at these meetings year after year, there is an indefinable something that one cannot put in words which comes out of our relationship to one another, and I feel doubly this honor that you have given me.

When I was quite young I got hold of a little article by Schumann, the musician, the title of which was "Advice to Young Musicians," and I remember very well that he closed his little piece of advice to musicians with these words: "Strive for the applause of the profession rather than that of the rabble." That advice has been the guide of my pro-

fessional life, and it has been accentuated by my relationship to you men.

I ask all of you for the coming year the same support that you have given my predecessors, and on my own part I will strive to do as well as they have done. I thank you. (Applause.)

Dr. R. W. Corwin: I have a resolution which I desire to present at this time. Every one knows that we are sometimes confused and perplexed with regard to what is brought before our Association. There is a discussion, and sometimes we are unable—especially those of us who are in the West and away from the centers—to know whom to believe and what to accept. If there is any method by which we can decide that the best is offered by the profession, let us by all means endeavor to have it presented to the profession, and so I desire to present the following resolution:

RESOLVED, That the Western Surgical Association appoint a committee, with power to act, to cooperate with committees from other associations which shall select a general standardization committee, whose duties shall be to investigate claims or suggestions, or research reports, or what not, that may be presented worthy of consideration, and after investigation and due deliberation give to the profession their recommendation.

The President: What will you do with this resolution?

Dr. Daniel N. Eisendrath: I move that the resolution be adopted. Seconded.

Dr. A. W. Abbott: I would like to ask if this matter has been before the Council.

The President: It has not officially.

Dr. Abbott: I move that the matter be referred to the Council. Seconded.

Dr. Corwin: That would delay it another year. It is better for us to act on it now.

Dr. William M. Harsha: I move that this resolu-

tion be submitted to the Council at the earliest possible time, with power to act.

The amendment was seconded, accepted, and the original motion as amended was put and carried.

Dr. Corwin: I would like to have this committee appointed by the President.

Dr. Earl R. Hare, of Minneapolis, read a paper entitled "Tumors of the Neck," which was discussed by Drs. Beck, Judd, and, in closing, by the essayist.

Dr. D. C. Brockman, of Ottumwa, read a paper on "Dermoid Cyst of the Inguinal Canal."

As there was no further business to come before the meeting, scientific or otherwise, President Freeman, after thanking the members for their attendance and making the meeting such a great success, declared the Association adjourned to meet at San Antonio, Texas, in 1918.

President's Address

PRIMITIVE SURGERY OF THE WESTERN HEMISPHERE

LEONARD FREEMAN, B.S., M.A., M.D., F.A.C.S.

DENVER, COLORADO

I have selected this subject for my address, because it seems peculiarly appropriate to bring before the Western Surgical Association something about the pre-historic surgery of the West, which, as far as I am aware, has not been done before.

Two causes of surgical and medical ailments were universally recognized among the early inhabitants of the Americas, one natural and the other supernatural. If the cause was not easily perceived, as was often the case, it was regarded as supernatural. The supernatural diseases were supposed to originate in various ways: by the casting of spells, by contact with some objectionable person or thing, or by the presence of something in the system, such as an evil spirit, a stone, a piece of wood, a worm, or an insect. Manifestly, they came just as near to the recognition of bacteria as they could without knowing anything about them.

It must not be thought, however, that real causes

were not given their due significance, if they made themselves sufficiently apparent, as often happened in surgical lesions at least. The ancient members of our profession were by no means always as childish as they are sometimes represented to have been. It goes without saying that supernatural ailments can be treated by supernatural means only, which accounts for the existence of the so-called medicine-man, with his impressive fetishes, antics, and incantations. In this connection it should be understood that the word "medicine" was not confined originally to material remedies, but had, in addition, a magical and supernatural significance. Hence, a "medicine-man" was not only a physician in our sense of the word, but was also a sort of priest, prophet, magician, and all-around dealer in the mysterious.

THE MEDICINE-MAN

The medicine-man[1] was usually a person of more than ordinary tact, knowledge, and intellect. In addition to being a surgical and medical authority, he also was consulted on many things concerning the spiritual and temporal welfare of his people. Although dealing extensively in the occult, he had a dignified and firm belief in himself and his methods, and was much in earnest in spite of the legerdemain and grotesque dress and actions that he employed to emphasize his doings and impress their importance on the observer. There is even reason to believe that his fantastic dances and gestures, facial contortions, and weird chantings exercised a hypnotic influence on his patients, leading to relaxation and sleep, which may have facilitated the recovery of some who would have been given up to die by more civilized practitioners. In fact, when one comes to think of it, such things

are merely an exaggeration of that "personal influence" which every physician is supposed to exercise in greater or less amount.

To a certain extent, the medicine-man was the protector of the persecuted, and the refuge of the fugitive. Even an enemy could find sanctuary in a medicine-lodge, where his wounds were dressed and his other needs attended to. We should indeed be proud that this same spirit has always characterized the medical profession of all times, and that it still exists among us. Looked at from this point of view, the Red Cross is a great medicine-lodge.

It was not much easier to become a "medicine-man" in those days than it is now. The usual method was to spend at least a year with a preceptor, paying him well for his instruction. There was much to be learned and remembered, for these preceptors all varied in their bewildering practices, and it was customary to study under more than one. As with the modern doctor, even after graduation the life of the medicine-man was not one of pampered ease. He was compelled to respond to every call, night or day, although the Pueblos permitted an exception to the rule if the unwilling physician could catch the messenger within a given distance and kick him. How many of us wish we had the same privilege!

If the patient died, the doctor also ran the risk of death at the hands of the relatives; and, at the very least, a number of failures to cure led to a loss of reputation and final dismissal from the profession. There was, however, a saving clause, at least among the Pueblos; for, when the medicine-man's power began to wane, he could rejuvenate it by rubbing his back against a certain sacred stone. The location of one of these stones is still known.

The fees were of good size, and were paid promptly, often in advance. They consisted, not unlike those

of a country doctor, of such things as blankets, horses, skins, weapons, and various other personal effects. It should be emphasized, however, that, to the credit of the profession, much charity work was done then, just as now.

Curiously enough, there exists throughout the world a marked similarity in primitive medicine which suggests, perhaps, a common origin of the various races. In accordance with this, the methods of treatment were often identical among the prehistoric peoples of North, South, and Central America, including the Indians, the Pueblos, the Aztecs, and the Incas. The old Spaniards were in a position to observe these things, and should have been able to tell us much about them; but, unfortunately, those aggressive pioneers were more interested in killing than in curing, so that their descriptions are unsatisfactory and meager. Enough has been handed down, however, to make it clear that considerable crude but efficient surgery was practiced, some of it being done in hospitals, at least in Mexico.

PRIMITIVE AMERICAN SURGERY

Let us consider this primitive American surgery more in detail:

Trephining.—As is well known, this is one of the very oldest surgical operations, and was extensively practiced by prehistoric peoples everywhere. It is probable that it was done, not only for therapeutic purposes, but for other reasons as well; for instance, to let out evil spirits, to obtain amulets for decorative and other uses, or merely as a religious rite. The wearing of amulets made from sections of skulls was a common custom among the earlier inhabitants of the world. They were mostly obtained post mortem,

but some were evidently removed from living captives, possibly with the idea that they were more potent as talismans against disease, or that they conferred on the wearer the physical or mental powers of the original owner.[2] But there can be no question that much trephining was also done for therapeutic purposes—for fracture, epilepsy, insanity, convulsions, headaches, etc.—as it is among various primitive races today.

According to archeologists, trephining was done far more frequently in Peru and Bolivia than in any other parts of the Western Hemisphere. Among 12,000 skulls from Bolivia, for example, 5 per cent had undergone this operation, and in Peru the percentage was not much less, showing that the procedure was much more common then than now. Less is known about trephining in the United States, although occasional skulls with the characteristic openings have been found in the tumuli of the mound-builders. It was more frequent, however, in Mexico and Central America.

Although many of the operations were done post mortem, others were ante mortem, as is shown by the growth of bone around the edges of the openings. It may be inferred that some of the patients died during the operation, the button having been outlined, but not removed. We can well imagine that a "death on the table" must have been accompanied with the same bitter regret and disappointment as it is today.

We are justified in believing that these surgical interventions were frequently for therapeutic purposes, because fractures are often found in connection with them; and, even when no fracture can be seen, it is not unreasonable to suppose that a puncture of the skull, such as must have been frequent from the spiked war-clubs then in use, may have existed and been removed by the operation. And, in addition, the fact that the openings were sometimes at a distance from

the break in the bone might well mean that the principle of decompression was recognized—perhaps learned from experience in trephining for headaches, epilepsy, insanity, etc. In fact, if we do not regard these operations as deliberate decompressions, they would seem to be purposeless.

In the Smithsonian collection is the skull of a Peruvian mummy on which the dried soft parts are still in place. A trephining has been done at the seat of a fracture in the left temporal region, the interesting point being that the face is strongly drawn to one side, apparently the result of paralysis—a most uncanny phenomenon, to say the least. (Fig. 1.)

Most of the trephining operations in America do not seem to have been done very skillfully. They were crude jobs done with crude tools that often slipped during the laborious process, as shown by scratches on the adjacent parts of the skull.

The shape of the opening was usually square or oblong, although sometimes round or oval. The square opening (Fig. 2) was peculiar to South America. It was made by cutting four rectangular intersecting grooves, almost but not quite through the bone, and then prying out the loosened piece of skull. The round openings (Figs. 3 and 4) were produced by gradual scraping, as shown by the characteristics of uncompleted operations.

From the nature of the grooves and the lines on their sides, it is probable that they were cut with a stone instrument, like a spear-head, set in a handle and possessing a rough and rather blunt point,—a kind of single-toothed, stone-saw, as it were, by means of which the bone was slowly worn away by a to-and-fro motion aided by strong pressure. It is likely that the round holes were scraped out with sharp flakes of flint or obsidian, as is still done by certain more or less uncivilized tribes in various countries.

Fig. 1. Head of Peruvian mummy, showing trephine opening in left temporal region, and an apparent right facial paralysis. (U. S. Ethnological Reports.)

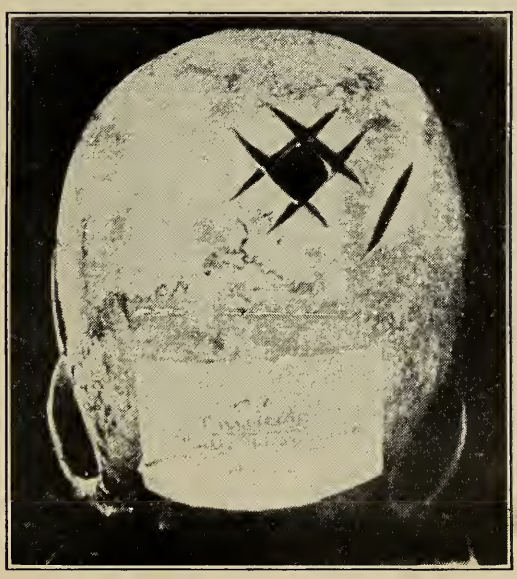

Fig. 2. Square trephine opening. (U. S. Ethnological Reports.)

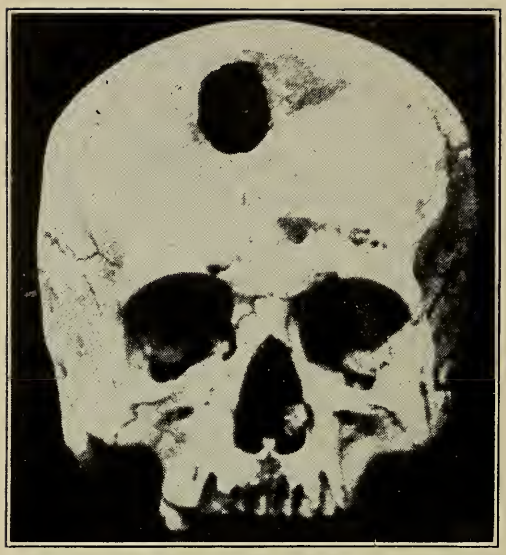

Fig. 3. Large antemortem trephine opening. (U. S. Ethnological Reports.)

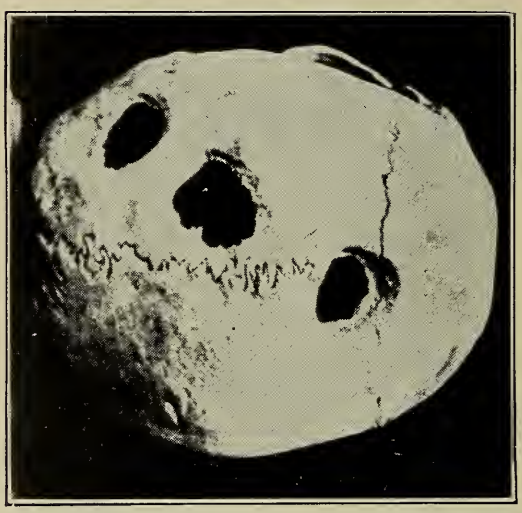

Fig. 4. Multiple antemortem trephine openings. (U. S. Ethnological Reports.)

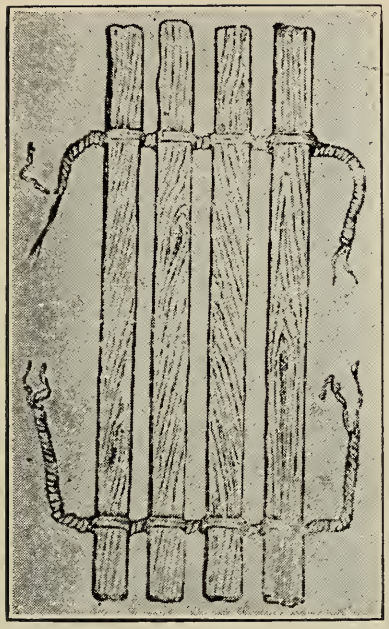

Fig. 5. Splint made of sticks held together by strips of rawhide. (Medical and Surgical Reporter, 1879, 2.)

Fig. 6. Splints found in ancient cliff dwellings of southwestern Colorado. (Museum of the State Historical and Natural History Society, Denver.)

For a number of reasons, it is supposed that the patient's head was held between the knees of the operator, who laid open the scalp with a crucial incision, and then sawed, scraped, and pried away at the unfortunate victim's calvarium, with many slips of his crude instrument, until an opening was made. The time required, as established by experiment, must have been at least an hour and often much longer.

It may have been that some sort of anesthetic was employed, such as was used by the Pueblo Indians; but, if not, what a nightmare of an experience it must have been for the patient, to say nothing of the nervous strain on the surgeon; although, when one considers the matter calmly, it could not have been much worse than the torture occasionally inflicted on us by our dentists. After all, much depends on the point of view.

It should be mentioned that trephining is still practiced in the same primitive manner by native medicine-men in the mountains of Peru, although they now employ pocket knives, chisels, etc., instead of instruments of stone. The operation is generally done for fracture, and is surrounded by great secrecy and certain mystic rites. It is said to be quite successful.

Fractures.—In the treatment of broken bones, the results were often surprisingly good. It was customary to set them, more or less skillfully, by pulling and manipulation; but permanent extension was not often, if ever, employed. Splints of various kinds were in universal use. They frequently were made of bark, the natural curves of which facilitated adjustment to the limb, especially after soaking in hot water and cutting away portions to accommodate bony prominences about the joints. Grass, scrapings from tanned hides, and other soft substances were used for padding. Occasionally the splint was filled with moist clay, which enclosed the limb somewhat like a plaster cast,

and must have been both comfortable and effective. A window was always left over the site of a compound fracture to permit of attention to the wound.

Other sorts of splints were made from sticks or pliable branches, such as green willows, held together by strips of bark or leather. (Fig. 5.) The Cliff Dwellers of the Southwest, who from their mode of life must have broken their bones often, knew how to manufacture splints that scarcely could be improved on. Specimens exhibited in the Museum of the State Historical and Natural History Society, Denver, are beautifully made from polished wood and correctly curved to fit the limbs for which they were intended, the edges being nicely rounded to prevent injury to the skin. (Fig. 6.) Similar splints were employed by the Aztecs.

Often the splints were removed, and the limb massaged, a practice that gives good results and deserves more attention than is given to it by modern surgeons.

In the treatment of fractures, the Hopi Indians employ splinters of trees which have been struck by lightning, not, however, as splints, but merely as fetishes. For some reason or other, they believe that those who have themselves received a lightning stroke are possessed of special skill in the care of broken bones—rather a severe requirement for a specialist in fractures, one would think.

In the Field Museum, Chicago, is exhibited an excellent pair of well-padded crutches from the cliff dwellings of southern Utah. (Fig. 7.)

Dislocation.—The reduction of many of the simpler forms of dislocation was quite generally practiced, both by extension and by manipulation, although the methods were of course empiric and without scientific foundation.

Treatment of Wounds.—The suturing of incised wounds was a common procedure; but it was consid-

ered so necessary that free suppuration should occur that thin pieces of bark were sometimes placed between the edges in order to check primary union. The sutures were obtained from animal tendons, human hair or plant fibers. The tendons were smoked hard and dry, and were not absorbed, but were removed in about a week. It was customary to provide for ample drainage, which was often facilitated by the insertion of strips of bark or other material.

The frequent washing of all sorts of wounds, perhaps several times daily, was universally practiced, and may have had much to do with the rapid, not to say astounding, recoveries that are said frequently to have occurred. The irrigations were made with simple cold water or with decoctions of certain things, such as basswood, willow, slippery elm, lichens, and various herbs. In addition, the wounds were often packed with charcoal, ashes, piñon gum and other balsams, or sprinkled with these substances in the form of powder. Most of the balsams and decoctions probably had more or less of an antiseptic action, but it is questionable if this was sufficient to be of much value.

Saliva, both pure and mixed with other things, was very generally used; in fact, it was quite the proper thing for a physician to spit on a wound or into the materials used in its treatment. What consternation such a proceeding would produce in the operating-room of a modern hospital! Nevertheless, we should not forget that animals always lick their injuries, and that lesions about the mouth heal even more readily than elsewhere. Another revolting custom, according to our point of view, was the sucking of pus out of wounds,—a much valued method of treatment.

In Brazil, large open wounds of the extremities were sometimes handled in an extremely interesting manner. The part was wrapped in the inner bark of a tree, and suspended on a frame over a bed of glow-

ing coals until nearly roasted. This method was painful, but is said to have been effective, primary union often resulting within a few days under the most unpromising circumstances.[3]

Although there is little evidence that actual laparotomies were ever performed, we at least know, from a description of an operation witnessed early in the seventeenth century by Bernabé Cobo, that they were sometimes "faked" for psychologic purposes. He says: "The sorcerers [medicine-men] did as if they would open him by the middle of the body with knives of crystalline stone, and they took out of his abdomen snakes, toads, and other repulsive objects." However, when we remember with what dexterity the human body was opened for sacrificial purposes by the Aztecs, it should not be surprising if they sometimes performed operations on the internal organs.

Punctured Wounds.—Among the Pueblos, especially, no attempt was made primarily to remove foreign bodies, such as arrow heads; but they were gradually forced out by firm kneading and pressure applied to the surrounding parts. It was sometimes necessary to continue this painful procedure for several days, although in the end it was generally successful; but, if it failed, an operation was done through a crucial incision. Irrigations with various decoctions were frequently practiced. These were sometimes squirted deep into the openings through a quill or a hollow bone by means of the mouth or a syringe made from a bladder. Some of these primitive surgeons used sticks wrapped with cotton to swab out punctured wounds, as part of the general program of cleanliness, which, although they lacked the Dakin's solution, nevertheless, reminds one of the methods of Carrel. The cleaning of punctured wounds by sucking out the pus with the mouth was an ordinary and widely spread custom, which undoubtedly possessed merit in spite of its objectionable features.

Treatment by Suction.—This was done with the mouth, either directly or through a tube of stone, wood, or bone. (Fig. 8.) In this way pus was removed from wounds, ulcers, and abscesses, and the vascular circulation promoted, thus calling to mind the modern suction treatment advocated by Bier. Even the thought of using the mouth directly for such purposes is repulsive, but the danger to the physician was slight, and the method was undoubtedly effective. After all, was it much worse than the many gruesome things done by medical students in the dissecting-room? In Bolivia, at the present time, medicine-men have been seen to suck suppurating wounds and even syphilitic ulcers. Men who were thus willing to sacrifice themselves for the welfare of their patients should be respected and not ridiculed, just as we honor the young physician who heroically applies his mouth to a tracheotomy wound in a case of diphtheria.

The imaginary foreign bodies supposed to cause many diseases were also removed by sucking, being first located by the supernatural vision of the medicine-man,—a sort of Röntgen-ray eye, as it were. The results were made more tangible by previously placing something in the mouth, such as a stone, thorn, worm, or insect, and producing it at the proper psychologic moment.

Numerous ailments were held to be due to the presence of bile in the affected part. This was sucked out directly with the mouth or through a tube, the surgeon apparently expectorating bile frequently during the process, being enabled to do so by chewing a species of yellow root in preparation for the occasion. Such procedures were of course nothing but blatant charlatanism, but they had a certain justification in the psychologic effect which they must have produced.

Cupping.—This was a common remedy. It was

done by suction through a buffalo horn or a tube of wood or stone, or even by the mouth alone. Enough force could thus be exerted to cause much congestion, and an expert in the art could even raise a blister. Wet cupping was achieved by a preliminary scarification of the skin. In the Museum of the State Historical and Natural History Society, Denver, are some peculiar wooden instruments from the Colorado cliff-dwellings, labeled "use unknown," which might very well have been employed for cupping. They have a hole on one side into which a stem could be inserted to suck through, the body of the instrument being used as a handle to press it firmly against the skin. (Fig. 8 *A*.)

Scarification.—This was an almost universal practice, both for local troubles and those of a more general nature. It was often done with a flake of flint, although more elaborate instruments were in use, provided with many sharp points made of fish spines, flints, etc. A method employed in Brazil was to make a number of cuts in the skin through which was inserted a stone instrument like a spear-head, which was moved about in the subcutaneous tissues,—a mode of treatment that could not have been popular among primitive patients.

Cauterization.—This was much used. It was accomplished with a coal of fire, a hot stone, or by burning a little ball of cotton or other inflammable substance on the cutaneous surface. Among other things, indolent wounds and ulcers were often stimulated by cauterization, and it was also employed as a counter-irritant in various painful affections. A favorite method was to burn tobacco or some other material in a tube made of stone (Fig. 8 *B*), and then blow the hot smoke through the tube on the area to be treated, decided virtues being attributed to the kind of smoke employed.

Phlebotomy.—This was extensively used in the treatment of local inflammation as well as many general diseases, being considered almost as much of a cure-all as it was with our medical forefathers. The vein selected was generally in the leg or arm, but occasionally in the neck or temporal region. The instrument employed in opening the vessel was made from a sharp flake of flint or obsidian, a thorn, a fish spine, or a tooth of some sort set in a handle. It was driven with a quick stroke into the vein. In Brazil, a little arrow, made for the purpose, was shot into the vein by means of a diminutive bow, thus coming as near to a "shotgun prescription" as was possible under the circumstances.

Inflammations.—These were treated commonly by poultices made from plants, leaves or barks (slippery elm, etc.), by cupping, and by counter-irritants, such as the cautery. When an abscess resulted, incision was often resorted to, and the contents were aspirated with the mouth, directly or through a tube.

Amputation.—Although not extensively practiced, amputation was undoubtedly done at times, the bleeding being checked, perhaps, by the application of hot stones, as has been observed among the Indians. An image of an ancient vase found in Peru distinctly shows the stump of a leg due to an amputation.

Hemorrhage.—The use of the tourniquet was undoubtedly understood by some, but the more common method of checking bleeding was by the actual cautery (a heated stone) or by local pressure, aided often by such coagulants as spider-webs and the fine fibers of plants.

Hernia.—Many medicine-men knew how to hold a rupture in place quite skillfully, with various forms of pads and bandages; but the most remarkable procedure was that resorted to by the Pueblos, who treated umbilical hernia by placing on it a number of large

black ants, the bites of which were supposed to have a curative effect. It would be interesting to know the origin of such an astonishing idea.

Pterygium.—Operations for pterygium were done in both North and South America, the growth being more or less skillfully removed with sharp stone knives. It was probably this operation that gave rise to the erroneous idea that cataracts were removed by these ancient ophthalmologists.

Artificial Skull-Deformities. — The production of these may be considered as a sort of orthopedic surgery[4] extensively practiced by various North American Indians, as well as those of Mexico and Peru. Sometimes a board was bound against the forehead of an infant, and kept there during early growth, resulting in a hideous flatness of the front of the cranium. (Flathead Indians.) Other tribes, such as the Vancouvers, Incas, and Aztecs, applied pads and tight bandages to the head in such ways as to render the skull conical, enormously elongated, or deformed in other monstrous ways. Although producing an outward semblance of idiocy, these peculiarities of form did not seem in any way to influence the mentality. Flattening of the occipital region, so commonly observed in collections of prehistoric skulls, was probably more or less accidental and due to pressure of the infants' skulls against the boards on which they were habitually strapped and carried.

Anesthetics.—Although it cannot be questioned that some of our primitive peoples possessed more or less reliable methods of anesthesia, it is hardly probable that these were very generally known or employed. For instance, the Zunis and some other tribes used for the purpose a substance obtained from the jimson weed (*datura meteloides*), containing stramonium. It was administered in sufficient amount to produce indifference to pain or even complete unconscious-

ness, and in this condition abscesses were opened, fractures set, dislocations reduced, and other surgical procedures accomplished. In spite of heroic dosage, no serious harm seemed to result. It is quite possible that this and similar methods were also in use among the Aztecs and Incas, who were so closely related in many ways to the Pueblos.

In this connection should not be overlooked the strong hypnotic influence undoubtedly exercised by the medicine-men, with their bizarre make-ups, weird incantations, and fantastic antics, which were well calculated to make a profound impression on their credulous patients.

NOTES

1. Although the title is masculine, it is interesting to note that there were also "medicine-women," who held high places in the profession and no doubt deserved the confidence placed in them by their clientele. The costume and make-up of a typical medicine-man is well described by M'Clenachan: "The face is painted, usually red, with yellow trimmings about the eyes and mouth. The hair, always worn long, has a tuft of feathers braided in at the crown; and to braids of hair hanging about the shoulders are attached horse-hairs, snake rattles, shells, etc.; over all is dusted red and yellow paint. The ears are pierced by numerous rings, and suspended from them hang shells, reaching to the shoulders. About the neck are strings of bright colored beads, with birds' claws, pebbles, buffalo teeth, etc. The wearing apparel consists of a shirt made of rawhide, leggins, breech clout, moccasins, and over all a blanket or buffalo robe. The shirt is daubed with paint, with some hideous image on the breast. The leggins are made to fit closely, but with a wide strip along the outside, to which is attached beads, bones, etc. The blanket or robe, in either case gaily adorned, is loosely thrown over the shoulders." Of the medicine-man's methods of treatment, Hrdlicka succinctly says: "The treatment varies according to the supposed necessities of the case, consisting of propitiation of broken tabus, repeated prayers to the elements or deities, the deposit of prayer sticks or countercharms in shrines, or appeal to the patient's personal protector or totem, the use of especially effective songs, rubbing or kneading (sometimes quite violent, though employed more commonly for supposed magic effects), rubbing liquid medicine into the skin, extraction of the objective cause of the disease, blowing air or tobacco smoke onto the patient, passes with fingers moistened with saliva, ceremonial observances or rites including painting of the body of the patient as well as that of the medicine-man and making sand paintings, noises (made with voice, rattle or drum), commands and exhortations to drive away bad spirits, assurances given the patient, various symbolic representatives, purification of the body by sweat baths, purging and emesis, strong sucking, cauterizing, scarifying, bleeding, external applications, the administration, externally or internally, of secret magic or other medicine, and various regulations of the behavior of the patient. In the larger curative ceremonies several medicine-men acted conjointly, or, if but one is present, he may have from one to several assistants."

2. Even in the materia medica of more modern times, powdered human skull, especially the wormian bone (known as the os epilepticus) was used as a remedy for epilepsy.

3. That the North American Indians occasionally did quite good surgery is evidenced by an operation, witnessed by Cushing, on an inflamed and gangrenous foot. The trouble was supposed to be due to a mysterious maggot, and the procedure was carried out for the purpose of dislodging it. A crucial incision was made, the dead tissue excised, and the bone scraped. The wound was then repeatedly irrigated, packed with piñon gum, powdered, and bandaged. The final result was satisfactory. Could a modern surgeon have done more?

4. The Museum of the State Historical and Natural History Society of Denver possesses an interesting appliance of bark made to fit the torso and provided with eyelets as though to lace it together in front. (Fig. 9.) It closely resembles the modern orthopedic corsets used in the treatment of lesions of the spine, and may have been used by the Cliff Dwellers for this purpose or for fracture of the ribs.

THE FATE OF THE CYSTIC DUCT AFTER CHOLECYSTECTOMY: AN EXPERIMENTAL STUDY*

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The occurrence of the following case awakened our interest in the question of the fate of the cystic duct after removal of the gall-bladder:

The patient, a woman, aged 50, had been operated on by one of my colleagues two years before being seen by one of the writers. The small, greatly thickened gall-bladder was found at the first operation to contain two large calculi, and cholecystectomy was done in the usual manner. The second operation was performed two years later on account of symptoms of recurrence (slight fever and chills accompanied by a mild degree of icterus). At this second exploration of the biliary tract, we found two bean-sized calculi in the supra-ampullary portion of the common duct which were the cause of her recurrence symptoms. Inspection of the stump of the cystic duct showed that it had become dilated so as to form a pseudogall-bladder nearly an inch long and about that of an almond in circumference. This dilatation contained a calculus about the size of a millet-seed.

*From the Nelson Morris Institute for Medical Research of the Michael Reese Hospital, Chicago.

The possible clinical importance of such a dilatation of the cystic duct after cholecystectomy did not occur to us until we read an account of a similar finding reported by Flörcken[1] in 1912. In his case a cholecystectomy had been performed three years before by another surgeon and the second operation was done on account of the recurrence of severe colicky pain. Flörcken found a cystic structure, the size of a plum (3.5 cm. long by 2.5 cm. wide) communicating with the common duct by a narrow pedicle, and, upon dividing it, bile escaped from the common duct, showing that a direct communication had existed between the pseudogall-bladder and the common duct. A soft brown calculus was found imbedded in the wall of this new formed gall-bladder.

Similar observations were made by Kehr,[2] Körte,[3] and Greensfelder (the last-named a personal communication). Kehr found in one of his operations for recurrence that the cystic duct had become dilated from its original size, 3-4 cm., to form a pseudogall-bladder 15 cm. long. Körte mentions finding a similar dilatation of the cystic duct.

Oddi[4] was the first to attempt to reproduce the above postoperative clinical findings by studying the effect of removal of the gall-bladder in animals. Oddi in 1888 found that in three large dogs killed at intervals of one, two, and three months, respectively, after cholecystectomy, the cystic duct had become dilated so as to form a globular structure, which looked like the beginning of a new formed gall-bladder.

DeVoogt,[5] in 1898, ligated the cystic duct as close as possible to the common duct in four dogs, then divided the cystic duct just distal to the ligature, and finally removed the gall-bladder. The animals were killed at intervals of 50 to 175 days. In all four animals a new reservoir for the bile was formed, which

averaged 2.5 to 3 mm. in length and was 1.5 mm. wide. The new gall-bladder was formed from the stump of the cystic duct.

It will be seen that in Oddi's experiments the newly formed gall-bladder represented the dilated cystic duct, while deVoogt's results showed that a true new gall-bladder had formed from the stump of the cystic duct.

Von Haberer and Clairmont,[6] in 1904, studied this question on twelve dogs and cats and one goat. In ten of these animals the gall-bladder was removed at its junction with the cystic duct and in two others both cystic duct and gall-bladder were removed. In one experiment only a small portion (0.5 cm.) of the cystic duct was left. The animals were killed at intervals varying from two weeks to six months. In all of the experiments in which the entire cystic duct had been left, this structure had become dilated to form a new gall-bladder, but this did not take place when the cystic duct was removed close to the common duct. The work of von Haberer and Clairmont therefore confirms that of Oddi in every detail. They injected the cystic duct of normal control animals, in order to see whether a similar dilatation existed, but the result was negative. The maximum degree of dilatation of the cystic duct was reached in about six weeks; and even in dogs killed as late as seven months after cholecystectomy alone, the new formed gall-bladder did not exceed the size of that observed in the six weeks' experiment. In all of their experiments the newly formed gall-bladder communicated with the common duct by a narrower patulous portion of the original cystic duct. As a result of these experiments the authors recommend removal of the cystic duct at the same time as that of the gall-bladder.

Judd and Mann[7] have recently reported a series

of experiments in which they observed a dilatation of all of the extrahepatic ducts after cholecystectomy in dogs and cats and, to a less extent, in goats. The dilatation varies from a slight degree to two or three times the normal diameter of the ducts. The greatest dilatation occurred at the juncture of the hepatic ducts coming from the upper lobes of the liver. The cystic duct was found to be dilated in a few instances. That this condition was not noted more often, they attributed to the fact that, usually, when a cholecystectomy is done, the cystic duct is ligated very close to its juncture with the hepatic duct (in dogs and cats the common duct is formed as in man) below the entrance of the cystic duct. The time necessary for the dilatation of the biliary tract varied, but usually occurred within sixty days. The chief factor in producing this dilatation is the inability of the sphincter of Oddi to withstand the increased pressure within the bile-ducts following removal of the gall-bladder.

The experiments of Judd and Mann, although very valuable in demonstrating a general dilatation of the extrahepatic bile-ducts, are of relatively little value in helping us to solve the question of the fate of the cystic duct, because the latter was usually completely ligated at the time of removal of the gall-bladder, so that but little if any dilatation of the stump of the cystic duct was possible. Hence their experiments, so far as the cystic duct is concerned, can be better compared with those of deVoogt than with the work of Oddi and von Haberer and Clairmont.

We desire to report the results of a series of experiments on dogs which were performed for the purpose of studying the effect upon the cystic duct of removal of the gall-bladder by the method usually employed in the human being, namely, division of the cystic duct at its juncture with the neck of the gall-bladder.

The technic employed was as follows: The dogs were anesthetized with ether. The gall-bladder was removed after ligation of the cystic duct at its juncture with the gall-bladder, no attempt being made to remove any of the cystic duct. The animals were killed at intervals of one week to three months.* A needle with blunt end was then inserted into the common duct through the ampulla of Vater, and a warm ten per cent emulsion of bismuth in vaseline injected immediately after killing the animal. No pressure was employed in injecting the above medium, so that no artificial distention could occur.

Control experiments were made by injecting bismuth-vaseline into (a) the common duct of a normal dog (Fig. 1), whose gall-bladder had been ligated at its juncture with the cystic duct, and (b) by measuring the degree of dilatation in a two months' experiment (Fig. 2), whose ducts had not been injected with the bismuth-vaseline.

Both of the above control experiments reveal the fact that the röntgenograms obtained in our experiments do not show an artificial dilatation of the cystic duct. The advantage of injecting the bismuth-vaseline is that it enables one, by placing the specimen upon a röntgenographic plate, to obtain an exact measurement of the degree of dilatation of the cystic duct.

The results of our series of experiments are shown in Figs. 3 to 6, inclusive.

At the end of one week the cystic duct has dilated so that it is about twice the size of the cystic duct in a control animal. (Fig. 1.) From the second to the sixth week the duct increases gradually until it attains its maximum degree of dilatation at the end of the sixth week. There is very little difference in the size of the duct at this time, and the one in a three months'

*In this preliminary paper only experiments in which the animals were killed within three months will be reported.

experiment.* In some of the experiments the dilated cystic duct (Fig. 5) has the shape of a pear, the narrower portion communicating with the common duct. There can be no question that the cystic duct in the dog at least gradually dilates to form a new gall-bladder, which attains its maximum size at the end of six to eight weeks.

The results obtained in animal experiments show that within a comparatively short period after operation (6-8 weeks) a dilatation of the cystic duct occurs which resembles the shape of the original gall-bladder. How often this has occurred clinically after cholecystectomy it is impossible to state, because there are few observations on record and the condition could have easily escaped the attention of even experienced operators. Whether such a new-formed gall-bladder can play an important part in causing recurrence of symptoms only future experience can tell. If the cystic duct is of normal length the degree of dilatation which is possible is much less than when one of the anomalies exists to which Ruge[8] first called attention. His work was confirmed to a great extent by Descompes[9] and Belloc. We are studying this question of the mode of union of the cystic and hepatic ducts, the result of which investigation will be published later.

There are three principal types of anomalous modes of union of the cystic and hepatic ducts: (1) the parallel type, in which the two ducts do not unite until a point a little above the ampulla; (2) the interior spiral type, in which the cystic winds around the front of the hepatic duct and enters the latter on its left border; and (3) the posterior spiral type, in which the cystic winds around behind the hepatic duct, and enters the latter either on its posterior, left lateral, or even its anterior surface.

*This observation agrees with that of von Haberer and Clairmont. (See report of their work on previous pages.)

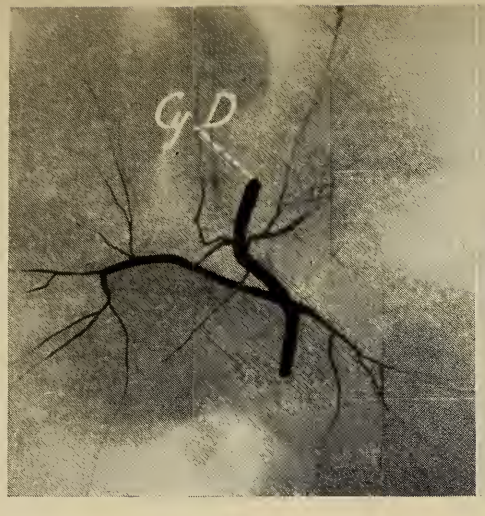

Fig. 1

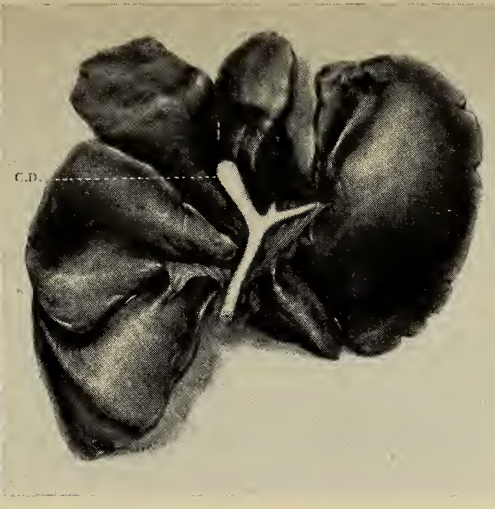

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

These anomalies of the ducts are primarily of great importance from the standpoint of the technic of cholecystectomy, but play a part in the formation of a new gall-bladder if the parallel type is present, in which the cystic duct may be from 5 to 6 inches long. Under these conditions it is easy to see how a good-sized new gall-bladder might form from the dilatation of such an abnormally long cystic duct.

Our chief object in undertaking this series of experiments and the publication of the clinical cases was to direct attention to the possible occurrence of such a sequel of cholecystectomy. Whether a removal of the cystic duct should be performed at the same time as the gall-bladder is removed will depend, first, upon the frequency with which such a condition is found as a cause of recurrence of symptoms, and, secondly, upon the fact as to whether the presence of the parallel type referred to above will permit the cystectomy to be done.

We wish to express our appreciation of the coöperation of Miss Gertrude Stern.

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DISCUSSION

Dr. Byron B. Davis (Omaha, Neb.): I have been very much interested in the paper presented by Dr. Eisendrath. I had the opportunity only two or three weeks ago to go over a lot of the specimens that Dr. Eisendrath has in his pathologic laboratory at the Michael Reese Hospital, and I feel that he is working on a line that is of the utmost importance, because we know what happens after removing the gall-

bladder. I think it is pretty well demonstrated now that the gall-bladder does reform after removal; that is, the cystic duct dilates. Now the question comes up whether under these circumstances we should ligate the cystic duct flush with the common duct, or should ligate farther away, near the base of the gall-bladder, in order to leave a considerable part of the cystic duct. Dr. Eisendrath rather concludes that the ligation should be done next to the common duct in order to guard against the formation of another gall-bladder and the possibility of recurrence of stones, some cases of which have been reported.

Just a word in regard to the function of the gall-bladder: I confess that I have been doing this operation for many years, and have always had some misgivings as to how much we maimed the individual by the removal of the gall-bladder. As I understand it, the function of the gall-bladder is carried on probably in two ways: first, contraction of the musculature of the gall-bladder helps to pump bile, so to speak, and relieve tension in the hepatic and common ducts, so as to afford a steady stream into the duodenum. In the second place, this is aided also by the inspiration causing pressure against the gall-bladder, as well as by expiration, and in that way helping to propel the bile through the common duct.

It has been demonstrated, furthermore, that the common duct and the hepatic duct dilate and lose their tone after the gall-bladder has been removed. It is a question in my mind whether the formation of this new gall-bladder is not a very wise provision of nature, and as to whether, if we did not have this dilatation, the after-history of these patients would be as good as it is now. It has occurred to me that the bile runs through the tube without any aid from the hepatic duct and the common duct; that we just have a sluggish stream there, without any assistance, and it occurs to me, in all probability, we need assistance in delivering that bile into the duodenum; and I cannot help but think that the conclusion of this would be that ligation of the cystic duct should be done when the circumstances permit, as near as possible to the gall-bladder, so as to leave the cystic duct to dilate and not impair the function by removing the gall-bladder and have no gall-bladder to return later. The cystic duct, dilating as it does, is an aid in keeping up the general circulation through the bile-ducts after the operation of cholecystectomy.

Dr. Arthur T. Mann (Minneapolis, Minn.): I have had one case which I reported before this Association, in which

I put in a rubber tube for the common duct, which had been destroyed some time before. The pressure of the bile down into the stump of the common hepatic duct produced an enlargement not much greater than a good-sized pea months afterwards. That is an observation.

The other question which the essayist brings up, that of abnormal or unusual relations of the ducts, is exceedingly interesting and very important because it very often determines the technic of our operation. A cystic duct which winds around on the wrong side of the hepatic duct needs to be noted, and one that winds under it needs to be noted. In some cases the hepatic duct goes down and joins what would have been the common duct below where the cystic duct had joined the left hepatic duct.

In two other cases I have seen the left hepatic duct lie in the sheath with the cystic duct, and with just ordinary care it would have certainly been ligated and cut off. In this case the right hepatic duct would have to be repaired in some way, or it would leave a permanent fistula. These things, I think, are at the basis of our change in technic to the old method of going down from the fundus to the duct. As things come out, we know that the hepatic ducts are not included in the material which we think is the cystic duct.

Dr. W. A. Dennis (St. Paul, Minn.): When one considers the very small percentage of all the bile formed that ever gets into the gall-bladder, it is hard to realize how the propulsive action of the gall-bladder can have very much function in maintaining the flow. It is difficult to see why the common and hepatic ducts require assistance in transmitting bile any more than the urine requires assistance in transmitting urine from the kidney to the bladder

It has seemed to me that, if the gall-bladder were bad enough to produce symptoms which were unmistakable or very definite and clear, it ought to be removed, and I am also of the opinion that the duct should be divided fairly close to the common duct.

A paper has been published within a month or so in *Surgery, Gynecology and Obstetrics* by a surgeon from Virginia, whose name at present I cannot recall, in which he commends opening the peritoneal sheath of the cystic duct, and exposing it before ligating it. This, it seems to me, is important.

In Dr. Eisendrath's cases, I have been wondering whether there might not have been obstruction in the common duct,

which would of course account for dilatation of the stump of the cystic duct.

Only one of our cholecystectomy cases has been re-operated on. A stone had been removed from the common duct at the time of the cholecystectomy, and a stricture had developed at the site of the stone. Even in this case with obstruction there was no evidence of any dilatation of the cystic duct.

I would be glad to know whether Dr. Eisendrath feels that he can eliminate the possibility of obstruction in the common duct in his experimental cases in which dilatation of the cystic duct has been found.

Dr. Henry T. Byford (Chicago, Ill.): Bile is secreted at certain times of digestion in large quantities. Sometimes it is secreted faster than is needed or can be utilized in the duodenum. The gall-bladder then serves as a reservoir to take up the temporary superfluity. During certain periods of activity of digestion, when food is going rapidly into the duodenum, the gall-bladder is stimulated to contract, and thus delivers its contents and increases the flow into the duodenum when it is needed most. I think that these two functions of the gall-bladder are pretty well established by physiology, and, taken in connection with the fact that the bile-ducts dilate after cholecystectomy, constitute sufficient evidence that the gall-bladder should not be considered a rudiment to be removed without a good reason.

Dr. Roger T Vaughan (Chicago, Ill.): I desire to ask whether any member present has had the experience of Dr. Case, of St. Luke's Hospital, Chicago. He reported seeing bismuth, given for a stomach examination, pass up the common duct in two patients on whom a cholecystectomy had been performed.

It would be interesting to know whether the duodenal contents commonly enter the common duct in such cases. If, as in the patient reported by Dr. Dennis, after a cholecystectomy with a stricture near the ampulla, dilatation of the cystic duct failed to appear, this observation would lend weight to the view that this cystic-duct dilatation is due to the regurgitation of duodenal contents into the common duct. I have not seen such a case myself; perhaps some of the members of this Association have.

Dr. Emil G. Beck (Chicago, Ill.): We had two such cases as Dr. Vaughan has referred to, and we showed them before the Röntgen Ray Society in Chicago. The radiographer gave

the patient a meal, and then took a röntgenogram of the stomach and found a beautiful picture of the common and the hepatic duct. Twenty-four hours later we took another röntgenogram, and found that all the bismuth had disappeared. If any food enters the common duct it may produce serious consequences. In the case of bismuth it does not seem to be harmful.

I would like to ask Dr. Eisendrath whether he has made any sections of these secondary gall-bladders to ascertain if there is any increase in the muscular structure in the dilated ducts. If we reason logically, nature attempts to re-establish function of the gall-bladder within the duct, and its structure should assume the structure of the gall-bladder. If these sections have been made, I would like to know about them.

Dr. B. Merrill Ricketts (Cincinnati, Ohio): During the last few weeks I have received letters from men in the West and from the East concerning the congenital absence of the gall-bladder. I have not found such a case in the literature, although there is no reason why the gall-bladder should not be congenitally absent. We can have the absence of almost any other tissue in the body; and here it is very essential to speak briefly of the difference between destruction and regeneration. If the gall-bladder is congenitally absent, it shows a great endeavor on the part of nature to have a receptacle for the bile, and the probabilities are that dilatation of the duct in the absence of the gall-bladder is an evidence of nature's great attempt to preserve its integrity.

Concerning regeneration of the gall-bladder. We have to treat the ducts of animals to know. If we have dilatation, we have no additional structure, that is, no additional number of fibers. The ovary is the only tissue in the body capable of regeneration. If the gall-bladder has the ability to regenerate itself, then it is next to the ovary in its importance. So I feel that the remarks of Dr. Beck concerning sections of these gall-bladders would be interesting, but we would not expect a regeneration of tissue as gall-bladder tissue.

The President (Dr. Leonard Freeman, Denver, Colo.): I wish some one would explain to us why the cystic duct does not dilate when the gall-bladder is out of function. Perhaps it does, and I did not know it.

Dr. Eisendrath (Closing): In answer to Dr. Davis' statement that the new gall-bladder may not act as a compensatory structure, let me say it reverts back to the question of how shall we treat infection of the biliary tract? And this cystic-

duct question I can only hint at. One of our main objects is not only to remove calculi, but to destroy the possible source of re-infection. We cannot, however, get rid entirely of the infection in the intrahepatic bile-tracts, but our efforts should be directed towards removing as much of the cystic duct as we possibly can, since a few cases have been reported of dilatation of the cystic duct in the human.

In answer to Dr. Beck's question: I do not believe that a little stump of gall-bladder will play much of a part as a compensatory organ. It is more dangerous from the standpoint of harboring infection and the reformation of calculi than any good it can do as a muscular structure. We have not yet made sections of these dilated cystic ducts, but I shall do so in the near future with a view to determining whether there is any muscular hypertrophy.

I am very much indebted to Dr. Mann for the two cases he mentions of anomalous union of the ducts. We are trying in the present problem to work out the relation of the dilated cystic to the hepatic duct rather than the mode of union. I cannot recall any such anomaly where the cystic duct empties into the right hepatic duct, and the two main hepatic ducts unite below that.

In reference to the remarks made by Dr. Dennis: I remember very well the sphincter which Oddi described in connection with his experimental work. He described a sphincter that controls the lower end of the common duct, and it is the action of this sphincter which Judd and Mann in their work believe cholecystectomy overcomes. The pressure within the dilated common duct is sufficient to paralyze the action of the sphincter.

In the experiments I have shown you I have corroborated the dilatation of the common duct in dogs and dilatation of the intrahepatic ducts that Judd and Mann have shown. It does not, however, seem to me quite reasonable that, if this sphincter at the lower end of the common duct is paralyzed, dilatation above it results. I believe that the sphincter of Oddi still acts in these cases. In our experimental work we could not find any obstruction at all in the common duct.

The remarks of Dr. Vaughan, confirmed by Dr. Beck, are exceedingly important. I did not know of either one of these cases, and I am much indebted to them for reporting these cases of regurgitation of bismuth up into the common duct. We know such cases occur in the ureter. Every time we have an incompetent ureteric sphincter we have dilatation,

and can actually see, by injecting the bladder, a little fluid run up the ureters; and this corroborates the experience in gall-bladder work.

With reference to the remarks made by Dr. Ricketts: I will say that we are making experiments now with reference to regeneration of the gall-bladder. We are removing in dogs one-third of the gall-bladder, one-half of the gall-bladder, and two-thirds of the gall-bladder, to see what becomes of the remainder of the organ—whether it will regenerate and form a new gall-bladder. We are not yet ready to report the results of this experimental work.

THE EXTREME PENDULOUS ABDOMEN AND ITS SURGICAL TREATMENT BY A NEW THREE-FLAP OPERATION

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The surgical treatment of the pendulous abdomen is still in the evolutionary stage. One looks in vain for any reference to this subject in the ordinary text-books, and but very brief mention is made in the more exhaustive systems of surgery, though many excellent articles by Alexius McGlannan, Cullen, Wayne Babcock, and others, have appeared in the recent issues of the surgical journals. Especial mention should be made of the work of Blake in developing the double-flap operation, and of W. J. Mayo's operation for umbilical hernia, both procedures having their place in the treatment of some of the less marked types of the condition under discussion.. Pendulous abdomen is usually seen in women who have gone through repeated pregnancies, and in whom the panniculus adiposus is especially well developed. Modern methods of dress, which tend to displace the abdominal viscera into the lower abdomen rather than give support thereto, tend to aggravate the condition.

ANATOMICAL CONSIDERATIONS AND PATHOLOGICAL ANATOMY

Anatomical reasons for the condition are found in

the arrangement of the aponeurosis of the linea alba. From one and one-half to two inches above the symphysis pubis where the recti muscles decussate and are reinforced by the triangular fascia of the abdomen and the pyramidales muscles, the wall at this point is extremely strong. In no case was the stretching of the linea alba found to have passed below this point. Again, at a point immediately above the umbilicus the linea alba appears to be very dense and unyielding. In all the cases observed, a well-defined line of demarcation existed between the stretched part and the part above the umbilicus which had not given way. This point appears to be at the lowest lineæ transversæ of the recti muscles, and is situated just above the umbilicus. The point of maximum lateral stretching in all the cases seen by me was at the semilunar folds of Douglas. The recti muscles are displaced, and, while somewhat attenuated in some cases, do not enter into the parts that have given way.

The umbilicus, according to Cunningham,[1] is situated normally below the mid-point between the infrasternal notch and the symphysis pubis. It is opposite the fourth lumbar vertebra. In most of the cases referred to in this article it was opposite or below the symphysis pubis.

If an opening is made at the umbilicus and the hand inserted into the abdomen of one of these huge pendulous cases, a definite internal ring can be felt, which might be compared to the internal ring of an ordinary hernia. This ring is bounded laterally by the margins of the recti muscles, below by the point of decussation of the recti muscles about one and one-half inches above the pubis, and above by the margin of the linea alba, which has not yielded to the stretching corresponding to the lower lineæ transversæ of the recti muscles.

It will, therefore, be seen that, while at first sight

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the stretching of the structures appears to be universal to the whole anterior abdominal wall, it is entirely limited to a definite area. This area in the normal anatomy corresponds to a narrow line, the linea alba and that part of it lying between a point very little above the umbilicus and a point about one and a half or two inches above the symphysis pubis. (Fig. 1.)

SURGICAL TREATMENT

Surgical treatment should not be lightly undertaken, and is called for only when the condition is causing troublesome symptoms. The operative mortality has been high in this type of patient. McGlannan[2] places it at 6 per cent for massive non-strangulated, and 50 per cent for massive strangulated, hernias. These figures convey only a relative idea of the mortality, for we do not know what type of operation was done, or whether anything was done beyond a simple umbilical-hernia operation without any attempt at reducing the protruding abdominal wall. The cases becoming obstructed must necessarily be those associated with an umbilical hernia, as, obviously, it would be difficult to have an obstruction in a pendulous abdomen not accompanied by an umbilical hernia.

THE PREPARATION OF THE PATIENT FOR OPERATION

The preparation of the patient for operation in these cases is most important for two reasons: first, because the intra-abdominal pressure should be reduced to a minimum; and, secondly, the skin, which is moist and foul from intertrigo, must be cleansed and purified. For a week or ten days the patient should be put on purgation and a very restricted diet. Daily warm baths should be given, and alcohol applied to the skin of the abdomen. A folded sterile towel should be placed between the overhanging abdomen and the

pubis and kept in place by a narrow binder or bandage which falls into the crease and over which the towel folds. This should be worn during the preparation to prevent the two skin surfaces coming into contact with each other.

OPERATION

The pendulous abdomen, due entirely to an abnormal development of the panniculus adiposus where the muscular and aponeurotic structures are normal (Fig. 2), rarely calls for treatment, and, if it does, a simple lipectomy is all that is necessary.

In one case referred to me by Dr. H. P. H. Galloway, suffering from sacro-iliac strain, a lipectomy was done to facilitate the fitting of an orthopedic apparatus for the support of the strained sacro-iliac joints. This type of pendulous abdomen may be associated with an umbilical hernia, in which case a Mayo operation combined with a lipectomy is indicated. These types are not to be confused with the type of extreme pendulous abdomen where there is marked diastasis of the recti muscles and where the linea alba is greatly stretched. Their recognition and differentiation should not be difficult.

The following procedure, which I have named "The Three-Flap Operation," is, I believe, the method of choice when operative treatment is undertaken in the case of extreme pendulous abdomen. (Fig. 3.)

Two long incisions forming an ellipse are made from one side of the abdomen to the other, the upper passing above the umbilicus, the lower passing about two inches above the fold where the abdomen hangs over the pubis. The skin and fat are dissected away from the external oblique aponeurosis until the ring of the umbilicus is met. (Fig. IV.) The abdomen is then opened at the umbilicus, and the mass dissected

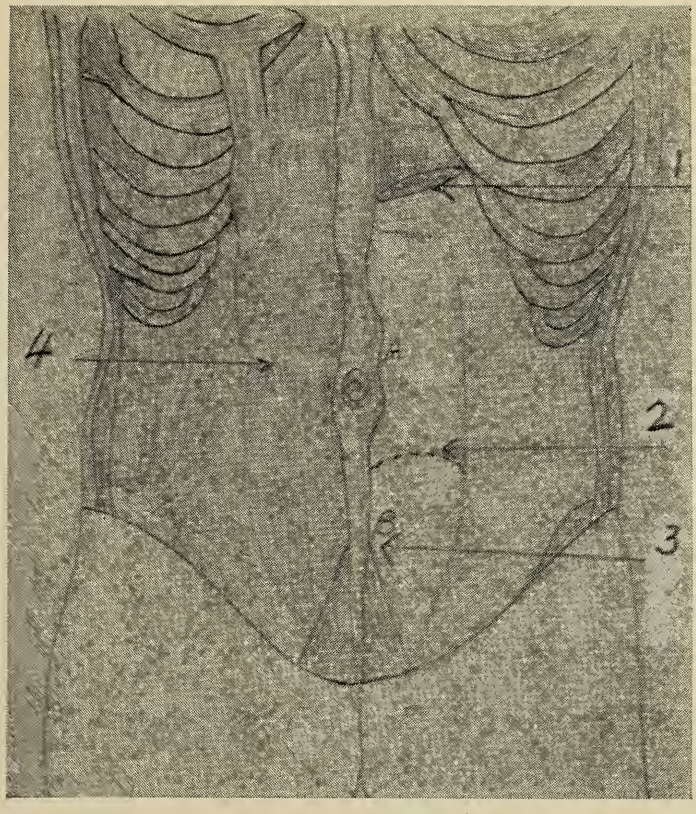


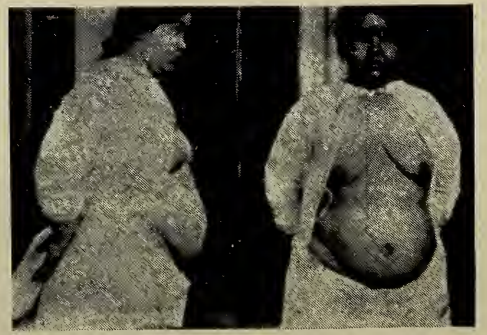
Fig. 1. Between the points A and B the linea alba yields most to increased intra-abdominal pressure. 1, rectus abdominis, cut across; 2, semilunar fold of Douglas; 3, point above pubes where linea alba is reinforced by the pyramidalis abdominis and triangular fascia; 4, lowest linea transversa.

Fig. 2. Pendulous fat. Abdominal wall not relaxed.

Case 1

Case 2

Case 3



Case 4

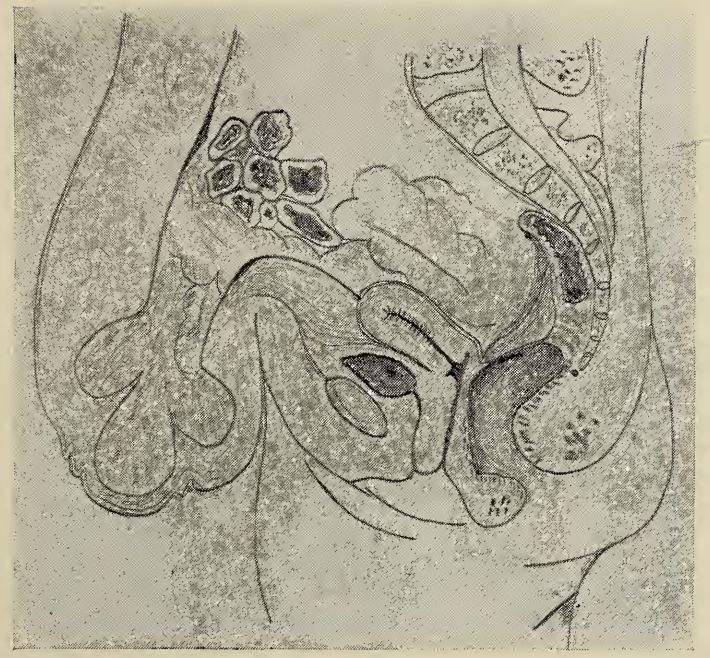


Fig. 3. Extreme pendulous abdomen with umbilical hernia, the umbilicus forming the apex of the protrusion.

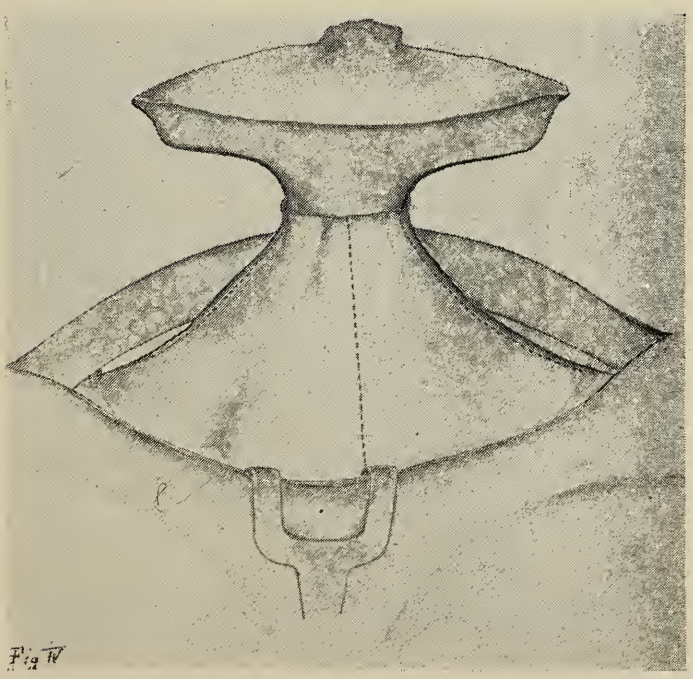


Fig. 4. Elliptical incision. Fat dissected from the external oblique aponeurosis, relaxed abdominal wall lifted up in the form of a cone.

away from the umbilical ring. Great care must be taken at this point, as the umbilicus is often dilated into a multilocular sac, and the contained omentum and intestines are often adherent. It will now be found that the part of the abdominal wall which has given way can be lifted up in the form of a cone with the umbilicus forming the apex. (Fig. 4.) If the fingers be inserted within this cone the internal ring already described can be felt at its base.

It will serve the purpose for the convenience of description to call this the internal ring of protrusion. The upper limits of the ring, while several inches from the umbilicus in the pendulous abdomen cases, is a point very close to the normal anatomical position of the umbilicus, and, as already mentioned, corresponds to the lowest lineæ transversæ of the recti muscles.

Two lateral incisions are now made from the umbilical ring to the inner margins of the recti muscles. A third incision is made from the umbilical ring downward to the firm lower margin of the internal ring, the point already described where the recti muscles decussate. (Fig. 5.) Three flaps are thus formed, two lower and one upper. (Fig. 6.) The two lower flaps are overlapped from side to side, thus reducing by one-half the space between the recti muscles. The free margin of each flap is stitched with strong chromic catgut to the firm margin of the sheath of the opposite rectus muscle. The upper flap is now drawn upwards, and the upper margin of this lower and now double flap is stitched to the upper margin of the so-called internal ring. (Fig. 7.) The upper flap is next drawn downwards and spread over the lower double flap and its margin stitched to the aponeurosis of the external oblique. (Fig. 8.)

It was found in my series of cases that, in all, the lower margin of this upper flap reached the point below where no stretching had taken place. The skin

is closed, and three small tube drains are inserted, one at each angle and one in the center of the wound.

It will be seen that in the place of the relaxed wall we have now a threefold aponeurosis covering the opening and secured at every point to normal anatomical structures that have not yielded to the intra-abdominal pressure.

CASE 1. Mrs. N., aged 49; mother of a large family; had an umbilical hernia over ten years; has been gradually enlarging, and the abdomen becoming pendulous.

Operation, 1913: Large elliptical incision from side to side; mass of fat weighing seven pounds removed with umbilicus, which was multilocular; great omentum adherent; three-flap operation. Recovery, normal; and result, excellent.

The patient was seen in 1917, and the condition was still excellent.

CASE 2. Mrs. H., aged 53; mother of several children; has had an umbilical hernia and pendulous abdomen for a number of years.

Operation, 1914: Transverse lipectomy; fat and umbilicus removed weighing seven and one-half pounds; three-flap operation; recovery, normal.

Patient was seen in 1917, and has a small inguinal hernia (bubonocele) on the right side. The abdomen is in excellent condition.

CASE 3. Mrs. S., aged 43; eight children; first noticed small swelling at navel fifteen years ago during pregnancy; has suffered from constipation, pain, and vomiting, diagnosed as attacks of acute obstruction.

Operation, January, 1916: Lipectomy, removal of umbilicus, which was very large and multilocular. It contained the lower part of the ileum, cecum, and appendix, ascending colon, hepatic flexure, and part of the transverse colon and the great omentum. The appendix was very large and markedly inflamed. The intestines and omentum showed recent inflammatory adhesions, undoubtedly due to peritonitis from the acutely inflamed appendix. Recovery, normal.

CASE 4. Mrs. D., aged 44.

I am including this case in this series, though, strictly speaking, it belongs to another class.

The patient had a large incisional hernia with a large amount of pendulous fat. The hernia followed an operation for removal of inflamed adnexa from the pelvis, which necessitated drainage. Though she had one week of preparation before operation for the hernia, she did not escape what we most dread in these cases, infection.

Operation, March, 1916: Lipectomy with reclosure of the hernia by overlapping. The center skin-drain discharged a greenish serum. Culture showed a streptococcus. The patient died on the fifth day from peritonitis.

Case 5. Mrs. T., aged 48; mother of eight children. After the last child six years ago, she noticed a swelling at the navel. This has gradually enlarged.

Operation, June, 1916: Lipectomy and the three-flap operation. Recovery, normal; and result, excellent.

Case 6. Mrs. C., aged 46; mother of several children. Some years ago she had an operation which was followed by an incisional hernia. The abdomen was pendulous, though the umbilicus was normal and not displaced. This did not seem to be a case for a three-flap operation; however, in trying to suit the procedure to the condition, it was found that the three-flap method filled the indications most perfectly. Recovery, normal, except that superficial infection occurred, and discharged from the center drain, which delayed convalescence.

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2. McGlannan, Alexius: Massive Umbilical and Ventral Hernias, Surg., Gynec. & Obst., 1915, xx, 700.

DISCUSSION

Dr. Emil G. Beck Chicago, Ill.): The operation which Dr. MacLean has described is a most ingenious one, and I am sure that he will want us to point out its possible shortcomings, as well as its advantages. The operation involves one new principle which is very important, that of overlapping the folds of the fascia. I am always reminded, when fascia is brought together, edge to edge, of the experiment with fly paper. If you take two pieces of fly paper and stick one on top of the other, you cannot pull them apart, but edge to edge they quickly separate; and so it is with a broad piece of fascia placed on top of another. The two layers form one strong sheath. In Dr. MacLean's operation we have three flaps of

fascia placed on top of each other, making a very strong abdominal wall.

The results that he shows us speak for themselves, and we are sure that the operation he has described is a very great improvement on other methods. There are two things, however, I would like to point out which are likely to be drawbacks. In the first place, he does not take advantage of the muscles of the abdomen, namely, the recti. After I have made overlapping suture of the fascia, I have been in the habit of bringing the muscles together, because in these cases they are away in the loin, and such a strong support as the muscles should be taken advantage of. I appose the muscles.

The other objection I have is the amount of suture material used in this operation. We can obviate that in many ways. Dr. MacLean takes a third flap. If you have these two flaps overlapping like this (indicating on the blackboard), he sutures the posterior part, which is essential, otherwise the omentum will slip in and produce a hernia. Then he sutures this against the upper part for the same reason. And here I would warn against the use of the interrupted suture, because, no matter how close together you put the interrupted sutures, there remains a little space between them, into which a small piece of omentum may slip, and cause adhesions.

In placing the third flap over in this way (indicating), if you anchor it down on each edge, in twenty-four hours there will be as much adhesion without any sutures as you desire.

I use very few catgut sutures, and thus prevent infection. I am learning all the time that we are using too much suture material, which is a great factor in causing suppuration.

Dr. A. E. Hertzler (Kansas City, Mo.): I want to say in connection with Dr. MacLean's paper that we can overdo this thing of lacing up elderly women. I operated on a woman a few years ago who had an enormous umbilical hernia, and in closing up a good deal of difficulty was experienced, and the patient complained that I was sewing her up too tight. I told her that I regretted this, and rather joked with her, since her abdominal contents had not been "home" for many years. (Laughter.) After she was put back to bed she appeared somewhat blue, and I felt somewhat the same way. To make a long story short, she died ten hours after the operation of acute lung edema. I think it was a question of putting too many estranged intestines back in the belly.

Dr. A. E. Benjamin (Minneapolis, Minn,): I am very glad indeed to have heard this excellent paper because this

class of cases has been very troublesome to all of us. I have endeavored to simplify the operation, and have utilized some of the principles employed by Dr. MacLean. After separating any adhesions around the hernia opening and the skin from the fascia I make a perpendicular overlapping of the fascia and muscles and peritoneum using interrupted U sutures of silkworm gut, which pass through the skin and are tied over gauze rolls. This distributes the pressure and makes a broader surface of approximation. Additional sutures of catgut are used to stitch between the U sutures of silkworm gut, and to stitch the anterior flap on the posterior. Split rubber-tube drainage is always employed in these cases. The number depends upon the size of the incision and the amount of fat tissue.

I must say that all these cases in which I followed this method have done well, the results being perfect. The operation is simple. However, I like the method of Dr. MacLean as he has described it. and shall employ it in certain selected cases.

Dr. MacLean (closing): I was glad to hear Dr. Beck mention the point of bringing the rectus muscles across, as it seems to me that could not be very well done without, as Dr. Hetzler has said, overdoing it, because in these cases the recti are very much displaced, say, from seven to eight inches. About seven inches was the average in my series. In doubling the flaps below you reduce the space by one-half, and that seems to be about as much as the ordinary case will stand. However, by crossing the flaps still further, fixing them farther out one under the muscle and the other over the muscle, you can reduce that space to the normal width of the linea alba if the tension is not too great; but that does not seem to be essential to success in these cases.

In speaking about the continuous suture. I will say I did the last case entirely with continuous suture. The double flap is stitched to the upper margin of the ring by continuous suture, and we run a continuous suture around the edge of the upper flap, securing it to the aponeurosis of the external oblique. I think, in stitching the edge of the upper flap down, it is necessary to stitch it all because it takes up a certain amount of tension laterally, as well as vertically, and reinforces the lower double flap.

I do not think that the intra-abdominal pressure which Dr. Hertzler speaks of should be so over-increased as to cause a fatality. I think it may do so in some cases, but in the cases

I have had there did not seem to be extreme tension when closed up.

The one unfortunate case I had was really not one of the typical cases, but was an incisional hernia. I brought it in to raise such a point. The patient undoubtedly died of infection. In my opinion the great danger in these cases is infection because of the extent of the work to be done.

I did not quite catch the point Dr. Benjamin made of overlapping without cutting the fascia. I do not see how we can safely overlap these cases without first cutting the fascia. It does not seem to me to be a safe procedure.

As to drainage: I think it is very important in these cases, and I use a tube in preference to a wick drain because it lets out the serous discharge without being under pressure. Fat patients are poor subjects, as a rule, to resist infection, and hence drainage is very important. We use at least three tubes, and more if considered necessary.

MULTIPLE ANASTOMOSIS FOR INTESTINAL OBSTRUCTION DUE TO ANY CAUSE

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The multiplicity of suggestions offered for the relief of intestinal obstruction, due to any cause, precludes the possibility of considering them in detail during the time allotted for the consideration of the subject at hand. It is therefore deemed proper to remark concisely upon the anatomy and pathology of the alimentary tract as they pertain to anastomosis for obstruction. Though much has been said and done to correct irregularities, both congenital and acquired, in the alimentary tract, much is left undone because of the want of a more perfect understanding of its physiological mechanism and that daring so essential for their undoing.

Research for methods to correct them and prevent their too frequent disastrous results is all that is necessary to carry conviction to the hearts of those who are willing to admit their failures and cause them to clamor for methods more consistent with reason.

Interference with the passage of contents through any portion of the alimentary tract means invalidism or death, depending upon the degree of the interference. For this reason a few cases have been selected for the purpose of demonstrating the more advanced methods for correcting such obstructions that such disasters may not occur.

Anatomy

a. Normal
b. Abnormal

Normal	Approx. length
1. Esophagus	9 inches
2. Stomach	8 inches
3. Duodenum	12 inches
4. Jejunum	108 inches
5. Ileum (13 feet)	156 inches
6. Colon	
Ascending	12 inches
Transverse	18 inches
Descending	15 inches
7. Sigmoid	9 inches
8. Rectum	7 inches

Total length, 29 feet 4 inches or 352 inches

Abnormal

a. Congenital
b. Acquired

Congenital

1. Variation in length
2. Variation in diameter
3. Variation in position
4. Diverticulæ
5. Entire absence of a part or all of any one or all divisions of the alimentary tract.

Acquired

a. Direct
b. Indirect

Direct

1. Neoplasms (Non-malignant and malignant)
2. Angulation
3. Ptosis
4. Stenosis
5. Volvulus
6. Impaction

7. Hernia
8. Adhesions
9. Paralysis
10. Enteroliths
11. Cicatrices
12. Foreign bodies
13. Gangrene

Indirect Neoplasms (Non-malignant and malignant)

1. Ovary
2. Uterus
3. Mesentery
4. Appendix
5. Liver
6. Gall-bladder
7. Spleen
8. Pancreas
9. Kidney
10. Peritoneum
11. Retroperitoneal
12. Foreign bodies
13. Bladder
14. Stomach

Non-malignant (Direct—Indirect)

1. Syphilomata
2. Papillomata
3. Adenomata
4. Fibromata
5. Polypoid
6. Ulcer
7. Fibrous bands

Malignant (Direct—Indirect)

1. Carcinomata
2. Sarcomata

Methods

1. Gastroduodenostomy
2. Gastrojejunostomy
3. Jeju-jejunostomy

4. Jeju-ileostomy
5. Ileocolostomy
6. Ileosigmoidostomy
7. Ileo-ileostomy
8. Cecosigmoidostomy
9. Ileostomy
10. Colostomy

Illustration i.

Constipation. Congenital absence of ascending colon.

Ileosigmoidostomy

White female, aged 58 years, without issue, constipation throughout life, severity increasing with age until serious.

Oblong Murphy button in lower third of the sigmoid. Result, most satisfactory since operation four year ago.

Illustration ii.

Constipation. Congenital Angulation of Ascending Colon.

Ileosigmoidostomy and *Cecosigmoidostomy.*

White female, aged 41 years, with issue. Constipation with increasing severity for twenty-five years.

Suture ileosigmoidostomy upper segment, and oblong Murphy button for cecosigmoidostomy lower segment. Continued relief for three years since operation.

Illustration iii.

Obstruction (18 inches distal portion of ileum).

Ileocolostomy (middle of ascending portion of colon).

White female, aged 52 years, with issue. Acute obstruction for thirty hours. Oblong Murphy button for anastomosis of normal ileum to middle of ascending colon. Recovery.

Illustration iv.

Obstruction (18 inches distal end of ileum).

Ileocecostomy and *Ileosigmoidostomy.*

White female, aged 49 years. Acute obstruction for 48 hours. Oblong Murphy button for ileocecostomy and round button for ileosigmoidostomy. Recovery.

Illustration v.

Obstruction 18 inches of the distal end of the ileum and a segment of 18 inches of the ileum about 36 inches from and above the ileocecal valve.

White female, aged 27 years. Partial acute intestinal obstruction for three days after removal of a sarcomatous ovary the size of a goose-egg.

Oblong Murphy button for anastomosis, resulting in large fecal stool. Dissolution 48 hours later.

Autopsy revealed ileus as described.

If paralysis of upper segment was present when the anastomosis was done an error was made in not doing simultaneously a second anastomosis above it.

Illustration vi.

Autopsy Specimen.

Dotted lines showing the two points on the ascending and transverse colons to which that portion of the descending colon below the angulation should be anastomosed without, in any way, disturbing the adhesions.

Illustration vii.

Schematic.

Ends of lines show where anastomoses may be made to secure lumen patency without excision of that portion of the gut containing one or more neoplasms.

Case 1.—*Acute obstruction.* Neoplasm in ascending colon immediately about the ileocecal valve.

Cecostomy. White female, aged 65 years. After fifteen months of constant drainage, resorted to ileosigmoidostomy

(Murphy button), removing at the same time a large concretion from the gall-bladder.

Integrity of gut well established, and preserved until the end of forty-two months, when, immediately after an attempt to relieve complete obstruction, dissolution occurred.

The physical condition of this woman remained excellent from soon after the first operation until a few weeks before her demise.

Autopsy showed that the neoplasm had increased in size but little, probably 10 to 15 per cent. This is significant because she had been mercurialized to limitation for several months at intervals after the discovery of the neoplasm of the first operation.

CASE 2.—*Obstruction.* Visceroptosis.

Cecosigmoidostomy. Stomach and transverse colon resting well in the pelvic cavity.

White male, aged 32 years, weighed 318 pounds when eighteen years of age. A glutton, but habits otherwise good. Serious gastric and intestinal disturbances began at about this time, and he continued to decrease in weight until operation, when he weighed 156 pounds.

Oblong Murphy button adjusted, after which a large amount of pendent abdominal integumentary tissues were removed. After seven months of tedious convalescence he resumed his duties in hardware store and now at end of three years is married. While the results have been reasonably satisfactory they would have been more productive had a gastrojejunostomy been done simultaneously with the cecosigmoidostomy.

CONCLUSIONS

1. The immediate mortality following surgical measures for intestinal obstructions, acute or chronic, especially acute, is probably as great as those applied for any other surgical condition.

2. The best way to lessen this high mortality is early single or multiple anastomoses done rapidly with local anesthesia.

3. One, two, three, or perhaps more sittings will best conserve this purpose.

4. Excision of intestinal pathology for obstruction has been too frequent.

5. Many supposed malignant growths are syphilitic or simple inflammatory products, and will disappear when irritation subsides.

6. Syphilis as a causative factor in intestinal pathology has not been given due consideration.

7. Mercury, when possible, should be given to limitation before and especially after the removal of intra-abdominal neoplasms, often elsewhere, because many will disappear under its influence.

8. Conditions necessitating the removal of any part, especially all, of the colon for any cause are seemingly in the great minority.

9. When obstruction exists at and above the ileocecal valve, both the cecum and the ileum should be anastomosed with the sigmoid or rectum, or both, several inches distant to each other in order that both cecum and ileum may be perfectly drained.

10. The jejunum should not be anastomosed with the colon unless it cannot be avoided; then it should be with the descending colon. The lower ileum, when possible, should be brought up to and anastomosed with the jejunum.

11. The ileum, when possible, should be made to drain the cecum and the ascending colon; but, when impossible to cause the cecum to be drained, the cecum should also be anastomosed with the sigmoid or the ileum distant from or near to the ileocecal valve.

12. When the ileum involves the jejunum the case is hopeless, but, if a portion of the ileum is normal, extending down from the jejunum, then anastomosis below the collapsed ileum or colon should be done.

13. Methods of choice are not altogether definitely fixed, suture being more practical in the majority of instances.

14. The presence of two buttons or bobbins in the

intestinal tract at the same time should be avoided when possible.

15. When multiple anastomoses are simultaneous, with one button, others should be by suture.

16. The button is better adapted to dire emergencies; and the oblong is better than the round button, because the oblong button produces a larger opening and is more certain to make its exit per rectum.

17. Drainage of all intestinal cavities should be provided for by anastomosis with button or suture, or with both.

18. Colostomies and ileostomies rapidly executed with local anesthesia are methods of choice in the majority of intestinal obstructions. If the patient survives, time will be ample for suture-anastomosis before returning the gut within the peritoneal cavity, after having done whatever else is necessary within that cavity.

19. The immediate mortality after removal of malignant growths from the intestinal tract is higher, and the longevity probably less, than when rapid anastomosis is done with local anesthesia.

20. Ambulancing patients with acute obstruction over cobble and rails should not be tolerated; better render the necessary service where the patient is found.

DISCUSSION

Dr. Joseph Rilus Eastman (Indianapolis, Ind.): I dislike very much to attempt to criticize a statement made by so distinguished a surgical bibliographer as Dr. Ricketts, but, if he means to say that the report of the first intestinal anastomosis was that of Velpeau, in 1822, he, I believe is incorrect. I have a volume by Sir Jonathan Bell, published in 1812, which describes intestinal anastomosis by suture.

Too much radical surgery has been done for the relief of intestinal stasis. A great many cases of intestinal stasis can be relieved by very simple surgical processes. I would like to call attention to three diagrammatic drawings which

illustrate what I regard as an occasional factor in chronic intestinal stasis. (Illustrating on blackboard.)

You are probably aware that up to the fifth month of fetal life the whole large intestine is supported by a long, flowing mesentery like the small intestine. There begins then a normal fusion between the parietal peritoneum and the mesentery of the ascending and descending colon, which obliterates the mesentery of part of the large intestine. This fusion extends up to the tunica propria or to the beginning of the peritoneal covering of the gut itself. If the fusion is normal, and if it is arrested at the beginning of the tunica propria, we have the normal anatomic condition, but, more often I think than most of us have realized, the fusion is excessive. It extends around the tunica propria more often than we have imagined, as far as or across the anterior longitudinal muscle band, so that we have the large intestine plastered directly against the mural serosa by the excess of normal fusion between the mural peritoneum, and the outer lamina of this long flowing mesentery. More often than you realize, perhaps, in cases of intestinal stasis, you can demonstrate to your complete satisfaction that this fusion has taken place to such an excessive degree as to almost cover in the anterior surface of a segment of the large bowel. The fusion is usually one which can be broken down by gauze dissection. One can free the ascending and descending colons so as to restore function, so that the large intestine can move as it should.

A Chicago anatomist and surgeon saw this thing and spoke of it. His name was Fred Byron Robinson. I do not know that he really recognized the nature and origin of this anomaly. Perhaps he did. I have never seen any printed statement to that effect. He does speak of the mural peritoneum being attached around over the anterior surface of the large intestine, not infrequently. A considerable number of times I have been able to relieve intestinal stasis by simply wiping away this excess of normal fetal fusion. It has nothing to do with what Dr. Jackson has described as membraneous pericolitis. This is not a vascular membrane which is formed by dilation of the ileocolic artery and vein; it is simply an excess of the normal fetal fusion between the outer lamina of the peritoneum of the mesentery of the colon and the mural peritoneum. I am sure that if you watch for this you will be interested to know how frequently it is present, and how you can demonstrate for yourselves that it is the cause of the arrest of gas, and how it gives rise to interference with the

propulsion of intestinal contents in the ascending and descending colons.

Dr. Jabez N. Jackson (Kansas City, Mo.): Unfortunately I did not hear all of Dr. Ricketts' paper, but with reference to the class of cases Dr. Eastman has just described I can verify absolutely his statements. I have seen a number of the conditions of which he speaks.

I agree very heartily with Dr. Eastman that surgery of the intestines in many instances is overdone, for a good many of these cases of chronic intestinal stasis are perfectly amenable to proper medical and dietary treatment, if the treatment is instituted at the proper time and kept up sufficiently long. On the other hand, there are cases of intestinal stasis that can be cured by simple measures. It is largely a question of mechanics. I am rather proud to make the statement that I have never done a short-circuiting operation, and I never expect to do it, as it has always seemed to me to be unanatomical and totally unsurgical to make a short-circuiting operation. We have learned a great deal about the physiology of the gut, and we are not dealing with an inanimate piece of plumbing. In a large number of these cases where the trouble is about the ascending colon, my experience is coming more and more to the point of believing that a very large proportion, if not a predominating number, of these cases are due to chronic infection from within the gut, and wherever a mechanical factor or factors are the consequence of the trouble, proper surgical measures should be instituted to relieve them; otherwise we do not bring about a cure. But, if the mechanics inside the gut are also to be treated, it is a problem as to whether our initial therapeusis is sufficient to relieve the original source of trouble, or whether an extensive operation should be undertaken to get rid of the irreparable damage done to the ascending colon. Most of these cases of chronic intestinal stasis are due to some form of bacterial activity, and we know nothing of what is passing through the lower gut, which is acting on the peritoneal coat and producing a secondary reaction. Where there is mechanical disturbance there should be undertaken some form of treatment directed to the relief of the initial intestinal condition.

Dr. Ricketts (Closing.): I do not want to be misunderstood concerning intestinal stasis, but my object in reading this paper was to get a free discussion. I am quite sure that I am familiar with the work of Byron Robinson, Dr. Eastman, and Dr. Jackson. What they have said is all very well

and good; but if we have a band across the ileum or ileus, I do not think we can avoid the so-called short-circuiting operation, and the sooner we do it, and the simplest way we do it, the better it is for the patient, because the highest mortality we have to deal with is from obstruction in its relation to stasis. I recall three or four cases in which it was suggested to remove the colon, but recovery was just as good by less radical measures. If we have a neoplasm I do not see how we can avoid a short-circuiting operation if the mortality is to be lessened.

In the paper I have presented to you I have tried to impress upon your minds not to take out all neoplasms of the ileum or colon immediately, but to give these patients a chance. You would not think of doing it in a case of acute prostate; you would let the man go six or eight weeks, and then remove a part or all of it. That is what we do in cases of obstruction of the bowel. I do not think we disagree on that. I think we are pretty much together on that point.

THE CLOSURE OF FECAL FISTULÆ

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One of the latest theories regarding deaths occurring in the course of a septic peritonitis, is that the patient dies from the absorption of toxic materials from his own obstructed intestinal canal, and not from the peritonitis *per se*. John W. Draper says peritonitis produces a septic paresis of the intestine, and its dammed-up putrid contents poison the individual so that he dies an acute septic death. Many such cases have been reported of late, and especially some intensely dramatic ones by Nyaelasy in the *British Journal of Surgery* of recent date.

If this theory is correct—and from our limited experience we believe that it frequently is the case—then the formation of a fecal fistula is the logical line of treatment in every case of septic peritonitis associated with intestinal distension. In one of our recent cases the patient was saved in this manner, only to die several days later, not from his intestinal poisoning, but from the sepsis of a large, unrecognized subdiaphragmatic abscess.

If, then, the formation of fecal fistulæ is to be a recognized course of treatment, the methods of closure are of special interest. In looking over our surgical histories of over 5,000 major operations running back during the past thirty years of surgical practice, we find the records of 77 fecal fistulæ following or associated with some intra-abdominal surgical condi-

Case No.	Pathological condition	Operation, etc.	Result
Case 1 Rec. 119	Tubo.-ov. abscess, 2 oz.	Glass drain; fist. closed in 3 mos.; only gas.	Fist. closed Recovered
Case 2 Rec. 125	Ov. abscess; not removed	Inflm. openg. sut'd.	Died on 3d day
Case 3 Rec. 147	Ov. abscess, 3 oz., connecting with Intestines.	Inflm. openg. sut'd.	Fist. closed Recovered
Case 4 Rec. 152	Ov. abscess; 8 oz.; thick pus	Inflm. openg. sut'd.	Fist. closed Recovered
Case 5 Rec. 164	Ov. abscess; 16 oz. pus.	Sac sut'd in wound, fecal disch.; Operated on by another physician.	Died
Case 6 Rec. 213	Tuber. salping., opening into rectum.	Rectum sut'd; leaked.	Died 2d day.
Case 7 Rec. 353	Rt. ov. cyst., 28 lb.	Sig. torn from its mesentery; end-to-end union with Murphy button; fecal fist. closed in two months.	Fist. closed Recovered
Case 8 Rec. 376	Double tubo.-ov. abscess.	Appendages removed; glass-tube drain; fecal fist. closed in 5 weeks.	Fist. closed Recovered
Case 9 Rec. 378	Double tubo.-ov. abscess; 16 oz. pus.	Appendages removed; glass-tube drain; fist. closed in 3 weeks.	Fist. closed Recovered
Case 10 Rec. 405	Ov. fist. leading to fecal abscess.	Murphy button; fist. not closed.	Recovered.
Case 11 Rec. 466	Double supt. ov. dermoids.	Appg. removed; glass-tube drain; fist. 4th day; closed 18th day.	Fist. closed Recovered
Case 12 Rec. 485	Intestinal fist. 1 yr. after laparotomy due to silk ligature.	Lig. removed; fist. closed.	Fist. closed Recovered
Case 13 Rec. 592	Resection of intestine.	Fecal pelv. absc.	Died.
Case 14 Rec. 647	Appd. absc. dschrg'ng in flank and thigh	Track explored; fist. in groin discharging feces.	Recovered.

Case 15 Rec. 652	Tuber. salping.	Appendg. remov.; gauze drain; fecal fist. 4th day; closed in three weeks.	Fist. closed Recovered
Case 16 Rec. 657	Appd.; abscess 4th day	Gauze drain; fecal fist. 2d day; did not close	Recovered.
Case 17 Rec. 686	Tuber. perit. and salping.	Appendage remov.; glass drain; fist. 3d day.	Recovered.
Case 18 Rec. 717	Obst. of bowels.	Resect. 5 in. of intestine; Murphy's button.	Died.
Case 19 Rec. 762	Tuber. perit. and fecal abscess.	Tube drain; fist. closed in 3 mos.	Fist. closed Recovered
Case 20 Rec. 799	Ov. abscess opng. in coil of ileum	Rt. ovary remov., and opening closed.	Fist. closed Recovered
Case 21 Rec. 946	Tuber. fist. between tube and intestines.	Fecal absc.; vag. sect.; tube drain; fist. disch. through tube.	Recovered 2 mos. later
Case 22 Rec. 991	Tuber. perit. and also mixed infection.	Later fecal fist. died of exhaustion end of 3 weeks.	Died.
Case 23 Rec. 1360	Ov. abscess, 8 oz. pus.	Gauze and vag. drain; fecal fist. closed 3 weeks.	Fist. closed Recovered
Case 24 Rec. 1362	Appd. abscess, first drained 6 weeks ago.	Append. removed; gauze sponge left; fecal fist. closed in 5 weeks.	Fist. closed Recovered
Case 25 Rec. 1378	Tuber. fist.	Resect. of small intest. end-to-end suture; enema next day came back through wound.	Died of septic tuber. peritonitis.
Case 26 Rec. 1418	Tubo.-ov. abscess; 3 oz. pus.	Hyster. both tubes; obst. 4th day; small intest. opened and drained.	Fist. closed Recovered
Case 27 Rec. 1464	Intest. los'd; original band divided.	Intestine resected.	Fist. closed Recovered
Case 28 Rec. 1491	Tubo.-ov. abscess; large-sized gauze drain	Post-mortem opng.; found tube; rectum leaked.	Died.
Case 29 Rec. 1468	Append. abscess.	Opened and drained; explored under liver; fecal fist.; post-mortem; 1 oz. pus in pelvis; lived 1 mo.	Died.
Case 30 Rec. 1522	Intest. gang. 6 inches small intestine; laparotomy 8 yrs. before.	Resection; end-to-end suture; fecal fist.	Fist. closed Recovered

Case No.	Pathological condition	Operation, etc.	Result
Case 31 Rec. 1569	Rt. ov. abscess, opening into ileum.	Removed absc.; resect 10 in. of ileum; end-to-end suture.	Fist. closed Recovered
Case 32 Rec. 1673	Tuber. ov. abscess, opening into ileum.	Removed absc. and 10 in. of intest.; gained 60 lbs.	Fist. closed Recovered
Case 33 Rec. 1747	Append. abscess; fist. vag. drain.	3 days later lap.; another absc. opened and drained; fecal fist. closed in 3 weeks.	Fist. closed Recovered
Case 34 Rec. 1750	Ov. cyst.; twist'd pedicle.	Opened; drained; 7th day fecal fist.; closed in 6 weeks.	Fist. closed Recovered
Case 35 Rec. 2110	Prostatic obstr.; perineal abscess remov.	Rectum opened and stitched up; closed at end of 1 yr.	Fist. closed Recovered
Case 36 Rec. 2363	Tuber. appendix.	Absc. opened and drained; fecal fist. 4th day; died in 2 mos. of exhaustion.	Died.
Case 37 Rec. 2799	Append. abscess.	Absc. opened and drained; alumin. tube; fecal fist.	Fist. closed Recovered
Case 38 Rec. 2853	Fecal fist. 15 yrs. after operation; three previous attempts closure failure.	Intest. edges loosened up and sutured; cured.	Fist. closed Recovered
Case 39 Rec. 3003	Append. abscess; 4 in. of ileum;6 in. of cecum; 2 in. of ureter.	End-to-end anastomosis; fecal fist. closed in 4 mos.	Fist. closed Recovered
Case 40 Rec. 3049	Append. abscess.	Tube drain through groin and back; fecal fist.; closed in 3 weeks.	Fist. closed Recovered
Case 41 Rec. 3259	Ov. abscess. (Tuber. ?)	Ovariotomy; intest. loosened and up sutured; fecal fist. closed in 4 weeks.	Fist. closed Recovered
Case 42 Rec. 3349	Append. abscess; fecal fist. drained.	Append. fist. would not close.	Recovered.

Case 43 Rec. 3401	Gangrenous perforated gall-bladder; drained.	Fecal fist. closed in 3 mos.	Fist. closed Recovered
Case 44 Rec. 3417	Carcinoma of ovary; removed 4 mos. before with cautery and curet.	Fecal fist. closed in 10 days.	Fist. closed Recovered
Case 45 Rec. 3486	Tuber. absc. fist. open'g. into sigmoid.	Appendage removed; fist. sutured; gained 10 lbs. in 3 mos.	Fist. closed Recovered
Case 46 Rec. 3498	Append. abscess; 6 mos. later intestinal obst.	Band divi.; 2 days later intest. opened and drained; fecal fist.	Fist. closed Recovered
Case 47 Rec. 5510	Fecal fistula.	Three weeks later; intest. loosened up and packed with gauze and sutured; closed.	Fist. closed Recovered
Case 48 Rec. 3554	Fecal fist. about stump of append.	Intest. loosened up and sutured; closed.	Fist. closed Recovered
Case 49 Rec. 3560	Tuber. multiple fist.	No improvement.	Died.
Case 50 Rec. 3578	Appd. absc. with obstruction.	Intest. opened wide; intest. resected; fist. left open; closed in 2 mos.	Fist. closed Recovered
Case 51 Rec. 3601	Double salping. Small sponge left in abdomen.	Removed from wound on 7th day; fecal fist. closed 6 weeks.	Fist. closed Recovered
Case 52 Rec. 3620	Append. absc. drained; fist.	Append. removed 3 weeks later and intest'l open'g closed; septic perit.	Died.
Case 53 Rec. 3847	Append. absc. 7 weeks ago; fecal fist. ever since; also fistula between append. and cecum.	Appendix removed and fist. closed.	Fist. closed Recovered
Case 54 Rec. 3869	Rt. ov. absc. opened into intestine	Ov. removed; intestine sutured; very sick for 2 weeks.	Fist. closed Recovered
Case 55 Rec. 3986	Acute append. perfor. 48 hours before.	3d day rec't sect; 4th day fecal fistula; slow convalescence.	Fist. closed Recovered
Case 56 Rec. 3997	Gen. tuber. perit. and salp.; rt. tube opening into sigmoid.	Opened later; fecal fist.; 4 mos. still open.	Recovered.

Case No.	Pathological condition	Operation, etc.	Result
Case 57 Rec. 4133	Old tuber. fist.; connecting with sigmoid	Several cheesy masses enucleated; opened again; closed in 4 mos.	Fist. closed Recovered
Case 58 Rec. 4167	Append. absc.; fist. for past 5 yrs. to root of appendix.	Fist. closed; sphincter ani dilated; cured.	Fist. closed Recovered
Case 59 Rec. 4239	Acute adherent appendix.	Append. removed; profuse suppuration; fecal fist. soon closed.	Fist. closed Recovered
Case 60 Rec. 4270	Tubal abscess, opening into small intestines.	Tube removed; intest'l opening closed; fecal fist.; closed in 5 weeks.	Fist. closed Recovered
Case 61 Rec. 4281	Cancer cecum; perfor. absc.; 1 oz. pus.	Fecal fist. 5 mos. later; malig. fist. still open.	Recovered.
Case 62 Rec. 4376	Gen. septic perit.; perfor. appendix; gang. spot on cecum; fecal fist. formed.	Supb. stab-drain; 3 weeks; died of exhaustion.	Died.
Case 63 Rec. 4457	Large append. absc. first vag. drain.	10 day abdom. expl.; fecal fistula in 5 days closed 6 weeks.	Fist. closed Recovered
Case 64 Rec. 4515	Gen. tuber. perit.; perf. of ileum.	10 inches resected; anast. fecal fistula. Died on 5th day.	Died.
Case 65 Rec. 4224	Large append. abscess; append. removed.	Large append. abscess removed. Fecal fist. 4 days; closed in one month.	Fist. closed Recovered
Case 66 Rec. 4249	Cancer of transverse colon.	Resection; lat. anastom.; fecal fistula 4th day. Died on 15th day.	Died.
Case 67 Rec. 4648	Intest. obst. from adhesion.	Paul's tube. Fist. opened three weeks; closed.	Fist. closed Recovered
Case 68 Rec. 4702	Tuber. absc. of append; operated on in country hospital.	Append. removed. Tube-drain; tube in too long; fecal fist.; died on 15th day.	Died.
Case 69 Rec. 4728	Ov. abscess; opening into the sigmoid and discharge on surface.	Fistula and absc. removed. Intest. sutured. Cured.	Fist. closed Recovered

Case 70 Rec. 4804	Acute append.	Appendix removed; intest. obstruct. 18th day; Paul's tube. Died of exhaustion 18th day.	Died.
Case 71 Rec. 4851	Volvulus of cecum; Paul's tube 3 mos. ago	Fist. loosened up; gauze packed; not removed. Cured.	Fist. closed Recovered
Case 72 Rec. 4854	Acute append. opening into coil of small intestine.	Append. and suture of intest.	Fist. closed Recovered
Case 73 Rec. 4868	Tuber. append. pulmo. and periton.	Fecal fist. 5th week. Died of exhaustion 6 weeks later.	Died.
Case 74 Rec. 4903	Uterine displacement; obst. of bowels; drain.	Large fecal fist.; packed with gauze; closed. Cured.	Fist. closed Recovered
Case 75 Rec. 4905	Gang. append.; obst. ileosigmoid.	Fecal fistula packed with gauze.	Fist. closed Recovered
Case 76 Rec. 2813	Append. absc.; tuber. (?)	Append. removed; large fecal fistula; closed in six weeks.	Fist. closed Recovered
Case 77 Rec. 4994	Fecal fist. for past 5 mos.	Fecal fist. in sigmoid; fist. in small intest. still disch.	Recovered.

tion which may be worth studying for a few minutes. There were 15 deaths, or a mortality of 19 per cent, which is a large mortality; but we must remember that these were often the very worst possible surgical risks, many of them done over twenty-five years ago,—bad appendiceal abscess cases associated with gangrene of the cecum, and, worse still, the mixed tuberculous fecal abscess cases, where the only hope for the patient was the assumption of a terrible risk by both patient and surgeon, as recently pointed out by Morrison in Binney's "New Surgery." This class is small, for many of these 77 cases were the accidental fecal fistula cases which closed by themselves. We were careful to exclude the cases of wound-suppuration where the colon-bacillus infection caused a discharge which resembled fecal matter, but which cleared up in a few days and really never was true fecal matter.

We find that the largest number (24 cases) of fecal fistula cases followed operation for appendiceal abscess. The next largest (22 cases) were associated with ovarian abscess; and 16 cases were due to tuberculosis, where the fistulous openings were between the tubal tuberculous abscess and the intestine. Eight cases followed injury to the intestine, including intussusception with gangrene. Three cases were associated with carcinoma of the colon. There were two tubal abscesses, not apparently tuberculous; one gangrenous gall-bladder, which was drained; and one fistula following a perineal prostatectomy some ten years ago.

"Nature's mode of cure in any intraperitoneal collection of pus is to cause a discharge of the abscess into the intestine," says Maurice Richardson. When the surgeon steps in and interferes with nature, he may come in just as the curative process is almost complete; and as nature cannot stop, the fistulous opening shows itself in a few days. Or, again, the drainage-tube may cause, and often has caused, a fecal fistula

Bulldog forceps, with points lodged in the appendix; found in the intestine after passing from the abdominal cavity.

in several of our earlier cases. The glass tube of thirty years ago was a frequent offender; next came the fenestrated aluminum tube, which was almost as bad. When it came to removing the fenestrated metal tube, and it was found that the omentum had filled its fenestræ so that it necessitated a general anesthetic to get it out and replace the omentum in the fistula, this was given up. Later followed the split-rubber tube, to be followed by a catheter on the third day. The method used today is usually a cigarette rubber drain, used without any gauze.

In regard to the closure of fecal fistulæ: We find that of all the cases, if they lived and the fistula had a chance to close, 80 per cent closed of themselves without any treatment, and nine-tenths closed in a period of time not exceeding six weeks; one or two went over six months, but closed entirely without treatment. Any fistula that stays open two months will probably need further surgical help.

I have heard the statement made that a tuberculous fistula cannot be closed. I find that we have closed five tuberculous fistulæ at the first operative treatment. The great number of our cases have not been associated with a spur. The clamping of a spur in an artificial fecal fistula is, usually, a simple procedure, and, if the two limbs of the intestine have been stitched together at the primary operation, is almost without danger and is uniformly successful.

Mr. Arthur E. Edmund's very ingenious clamp applied at the same time with Paul's tubes, drains the intestine, and is especialy applicable to small intestinal obstruction when it is necessary to make a temporary fistula.

In closing a fecal fistula by suture, just as in urinary fistula of the bladder, and as in all plastic surgery, the *great point* is to loosen up the tissues sufficiently so that there will be no tension. The free peritoneal cavity may be opened if necessary, and the suture

placed longitudinally, rather than transversely, especially if the opening is a large one, so as not to constrict the bowel.

For several years it has been our practice in suturing large fistulæ to paint the surrounding surface thoroughly with iodine, and then to pack the intestine lightly with gauze (just enough to keep back the fecal matter), leaving the gauze in place and not removing it after the stitches have been put in. The gauze is sometimes a little slow in coming through—in one case as late as the tenth day, but without any obstructive symptoms.

Many years ago, about 25, one of our patients was very sick on the tenth day after a laparotomy. On the twelfth day she passed from the anus a moderate-sized gauze sponge, which had been left by mistake in the peritoneal cavity. If nature can pass a sponge in this way out of the general peritoneal cavity, she certainly can pass one down the normal intestinal canal. Someone may say, How do you know that the sponge passed through the bowel wall? Because in another case, which was reported several years ago before the American Medical Association, I showed a moderate-sized bulldog forceps, which had been left in the abdominal cavity, and passed without much disturbance entirely into the intestine, but could not be expelled because its point had caught in the appendix; the mid-portion of the shaft was entirely inside the ileum, and the handles were entirely inside the cecum. There were almost no adhesions, except of the two involved coils and a generous wisp of omentum covering the points where perforations had taken place in the passage of the forceps into the intestine. Removal of the forceps with the appendix, and suturing of the intestine were not followed by even a fecal fistula. This woman lived for over ten years as a monument of great surgical resistance.

FOR DISCUSSION SEE PAGE 91

THE MANAGEMENT OF CASES WITH RUPTURED APPENDIX

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INTRODUCTION

When John B. Murphy read his startling paper on peritonitis at Atlantic City some ten years ago, and reported fifteen recoveries out of sixteen cases of appendicitis with peritonitis, his results were generally accepted with a degree of reservation; but the test of time, and the application of his principles to this class of cases, have proven the correctness of his statements and the rationale of the principles underlying the treatment of this malady.

The Fowler position was a great improvement on what had been generally used; Murphy combined with it large quantities of water by the bowel; Crile has since contributed the morphine; Crisler and Johnson have applied the iodine; and Hill has greatly improved the posture.

In spite of the great amount of missionary work the profession has done to educate the laity to the importance of early operation for appendicitis, we are still getting a large percentage of desperate cases, due to the inaccessibility to railroad facilities of large sections of the surrounding country, to illiteracy, and to an obstinate attitude on the part of some patients.

Type of Cases.—During the year 1917 we have

operated on twenty-one cases with ruptured appendix and extensive peritonitis. All cases brought in have been operated on, regardless of the length of time the disease had been standing or the condition of the patient when seen.

In this series no cases are included where the appendix was simply gangrenous, or even where it had become a gray sack of pus with an abundance of free fluid and local peritonitis, nor any cases where the process was walled off into a circumscribed abscess.

Every case in this series had a definite perforation, one or more, in the appendix; and in some cases not only pus but fecal matter was found free in the peritoneal cavity.

The extent of the peritonitis has been indefinite. We should not call them cases of general peritonitis, because all of the peritoneal surface was not involved; but we know they had extensive, spreading peritonitis and cellulitis, largely confined, in our judgment, to the right side of the abdomen and pelvis.

Most of the cases were in their third, fourth, fifth, and sixth days, one being in the second, and two in the seventh, the average being in the fourth day.

Presenting Symptoms.—The temperature was elevated in 75 per cent of the cases, ranging from 100° to 103.° Two were subnormal, and three were normal.

The pulse was accelerated in all cases but one, ranging from 100 to 160, the average being 120. One case had a pulse of 60.

Eighty per cent of the patients were vomiting when they came in, and half of them had vomited more or less from the beginning of the attack; 25 per cent had had persistent and uncontrollable vomiting.

The leukocyte counts ranged from 6,000 to 42,000, with an average of 16,000, and an average differential of 85 per cent polymorphonuclears.

The abdomen was distended in all but four cases.

Three were about normal, and one was scaphoid.

Right-sided rigidity was always well marked; and in one-half of the cases this sign was present about the same on both sides.

Localized tenderness was of little value in these cases as a diagnostic sign, as three-fourths of them were tender over the entire right side; one-fourth all over the abdomen; and only a few showed definite localization of the tenderness at McBurney's point.

Eighteen of the 21 patients had been purged, and only 4 patients had had any appreciable quantity of morphine.

Four of the patients were cyanotic with pinched features when they came in, and 7 were doubled over and would not straighten out.

Sixty per cent were in pain when seen; the others were fairly comfortable, although all were actually perforated; and each of 5 of them had a history of the definite time when he got sudden relief without morphine.

Preparatory.—When the patients came into our hands, we sat them up in Fowler's position, when feasible, to move them to the hospital; and a large dose of morphine, usually one-half grain, was given in every instance.

As soon as they reached the hospital they were warmed up, and rested from one to four hours, allowing them to get well under the influence of the morphine.

They were then given an enema, and catheterized before they went to the operating-room. The enema is usually effective, and removes a large quantity of material, which, if left alone, would produce troublesome gas and dangerous toxemia during the coming days of intestinal paresis.

We believe they should always be catheterized, as we have frequently found in this class of cases dis-

tended bladders, and some of them enormously distended, even after the patients had had enemas, and had been instructed to void, which in some instances they had done without emptying the bladder.

The patients were then carried to the operating-room, in a sitting posture when possible. The local preparation was done while the anesthetic was being administered, as most of these patients do not bear local preparation well beforehand.

Operation.—The muscle-splitting incision has been used in every case; and where more room was needed than this incision afforded the internal oblique was sacrificed in the direction indicated. Inasmuch as all these wounds become infected, we believe we get better union and fewer hernias after this incision than with any other.

The appendix, which is the real menace, has been removed in every case, regardless of its location or pathological condition. It was found to be abnormally located in about 90 per cent of the cases.

A linen purse-string suture was used in 75 per cent of the cases, and a simple ligature of cat-gut in the remainder, where the bowel would not hold sutures.

Comparing this series with an equal number where the same treatment was instituted, but the appendix left in, the mortality stands 10 per cent when the appendix was not removed and no mortality when it was.

Considerable trauma and manipulation were necessary in some cases to remove the appendix; and in others, where effort on the part of nature to wall off some part of the pathological process had already taken place, the barriers were necessarily destroyed during the procedure.

I realize there is some very good argument against what seems to be unjustified and desperate anxiety to get the appendix; but I believe the removal of the rotten tissue and the cutting off of the source of sup-

ply of the infection is much more beneficial than the necessary trauma is harmful.

During the removal of the appendix, the pus, fluid, enteroliths, and débris were gently sponged out; then the hemorrhage was carefully controlled; the packs, if any had been used, were removed; and the omentum, if accessible, was brought to the site of the operation.

Iodine.—A two and one-half per cent solution of iodine in alcohol, as recommended by Crisler and Johnson, was then poured into the peritoneal cavity, generally using four to six ounces. This may be poured in during or after the removal of the appendix, and should be carried to all recesses where infection seems to have become established.

I realize fully that this method has been very severely criticized by many authorities; but, after seeing its advocates apply the treatment, we began to use it cautiously several years ago, and since that time have used it in many different types of cases with infection in the peritoneal cavity due to inflammatory and traumatic disorders.

We have studied to the best of our ability in an impartial way the results obtained; and, while we do not use it on an absolutely scientific basis, as we have no definite proof of its action on the peritoneum and the bacteria, we are convinced by clinical observation that it has some merit.

We are ready to admit that it forms adhesions when applied to the normal peritoneum, but we are not so sure that it forms adhesions when used on an inflamed peritoneum; and, if it does, we have no evidence to convince us that they are permanent or detrimental, but our observation and experience prove the opposite to be true, as we had more adhesions and more obstruction before we used iodine than we have now, using practically the same technic otherwise. The adhesions so formed, if such is the case, may be beneficial, timely, and transient.

Crile says one of the methods of nature to combat peritonitis is for the peritoneum to exude a sticky, glue-like material, which process may be stimulated by the iodine and alcohol. We have observed an abundant serous drainage following its use, which is certainly in excess of the usual drainage when it is not used. We believe that it tends to disgorge and, in a measure, to wash out the subserous and cellular tissues and, incidentally, a lot of phagocytes loaded with bacteria before the bacteria can overpower the cell and again become a menace, as suggested by Wright.

We, furthermore, believe that more leukocytes are brought to the infected area by the iodine, as it must act as a foreign material, and tend to create a most active and proliferous phagocytosis, which is particularly desired in some of these cases, as they have low counts.

Inasmuch as the iodine is largely eliminated by the kidneys, and does not appear in the urine until after the first twenty-four hours, we believe that by its action the lymph-capillaries are probably closed, and there is little or no absorption of toxins from this area during this period, thereby giving the patient a resting spell and time to recuperate.

We have no proof that it does not act on the bacteria in some way detrimental to their activity, virulence, and multiplication.

It may tend to bring about paresis of the bowel with which it comes in contact, and in this way aid the morphine in arresting peristalsis. We have never observed any toxicity from the use of the drug, and in many cases we have poured in a pint. We do not believe it is dangerous or, in any way, detrimental to these cases.

Drainage.—The drainage material, we believe, should be quite plentiful, as a drain is likely to affect but a small area, and be useful for only a few hours.

We have instituted it in these cases as follows: Three plain, soft, large-sized drainage tubes were inserted, one being carried to the bottom of the pelvis, one back under the liver, and one to the old bed of the appendix.

We do not use perforated tubes, as we have seen one case of obstruction due to a loop of the ileum crawling into a hole in the drainage-tube. Each tube was stitched to the skin to prevent it from slipping in or out. The tube should come out in twenty-four to forty-eight hours, having served its purpose by this time; and, if left longer, it may cause pressure necrosis and fecal fistula.

A narrow gauze pack was carried alongside each tube,—first, to assist in the drainage by its capillary action; secondly, to act as a foreign body to excite nature to send out more local resistance, which is spent against the infection present; and thirdly, to establish a tract for drainage after the tubes are removed. The gauze was anchored by safety-pins.

The wound was closed with catgut, reënforced by a silk-worm suture above and below the tubes. These stay-sutures were tied quite loosely, and allowed to remain about two weeks unless indications arose for earlier removal.

Posture.—The patient was then put to bed in the Hill, or abdominal, position, usually turned slightly to the right side, with the head elevated about eight inches. This position was maintained the first two days in all cases, and longer if the drainage continued. Patients do not complain of this position when used along with the morphine treatment.

We have tried the various postures to secure copious drainage; and, after unbiased consideration of all the well-known facts germain to the subject and the many arguments advanced, together with a close observa-

tion of the cases, we believe this position is by far the most effective.

The law of gravitation, assisted by the intra-abdominal pressure, will, we believe, bring about a maximum amount of drainage in a given time when the patient is so placed.

Furthermore the toxic material is carried toward the least vulnerable region of the abdominal cavity, and to an area where fewer pockets are found, which act as pitfalls when other positions are used.

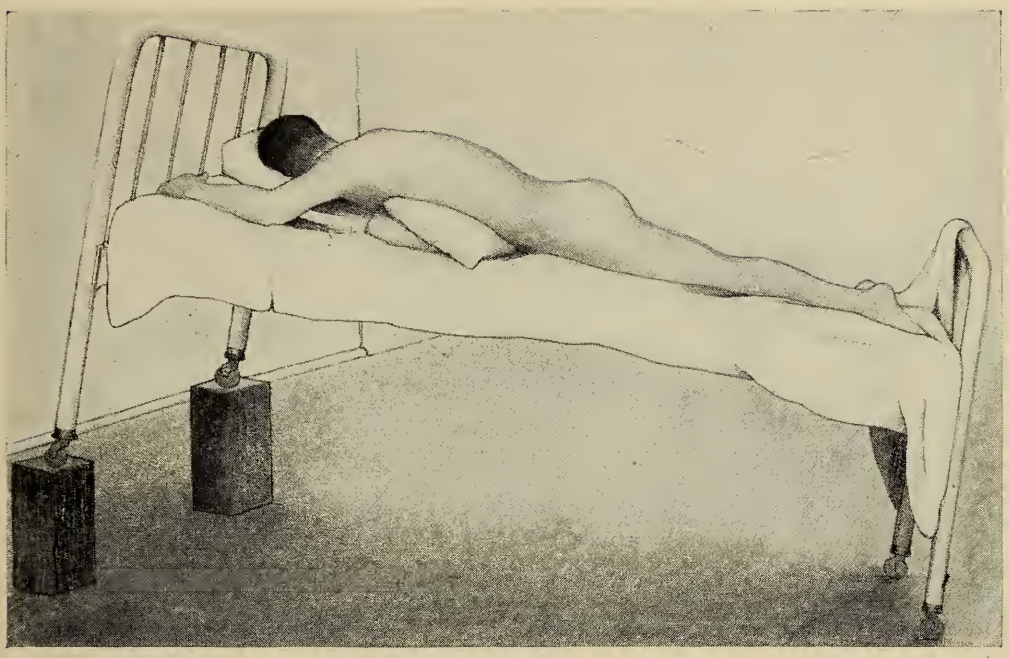
We know this position allows larger quantities of water to be given by the bowel than any other we have tried, with very much less discomfort to the patient and less trouble to the attendants. This is the first year we have used this posture, and the only time we have been able to get through a year's work with a clean slate in this class of cases. I agree fully with Hill that the posture is a very important element in the after-care of the drainage case. (See illustrations.)

Water.—As these patients come in usually in a depleted condition, we believe it very essential to get them filled with water as soon as possible; and begin by giving an initial hypodermoclysis immediately after the operation.

We then begin the Murphy drip with tap-water, and give all the patient will take. Our efforts to induce excessive kidney- and skin-elimination and keep the blood-stream full are greatly assisted by having the patient in the Hill posture. The nurses have estimated that these cases will take three times as much fluid in this posture, taking one case with another, as they will in the Fowler's position.

In the desperate cases, alkali drips are used; and in the more desperate and prolonged cases glucose is added.

In addition to the Murphy drip, we give all the water that the patient cares to take by mouth, but



The Hill posture, Fig. 1

The Hill posture, Fig. 2

nothing else. If the water causes vomiting, we continue to give it just the same, as we feel that it is beneficial, whether it stays down or comes up, and it, unquestionably, adds greatly to the patient's comfort and peace of mind.

Morphine.—Believing with Crile that deep morphinization prevents histologic changes characteristic of exhaustion, we have used the morphine treatment to the degree of stupefaction. In some of these cases the respiration has dropped to six or eight; in others it would be difficult to get it below twenty-four; but it is our effort to lower the respiration to fourteen, and keep it there; and induce a listless, stupefied, indifferent condition of the patient, in which he does not object to the Hill position, and does not suffer, or complain of hunger, nor does he worry about the seriousness of his physical welfare. This condition is maintained from two to four days, when the morphine is gradually withdrawn, and not used after except for pain. Then the patient is turned to any comfortable position which he cares to assume. It usually requires one-fourth of a grain every four hours to bring about the desired result, but frequently we have to use more, and, of course, less in children. I am fully convinced that they take vastly more water and retain it better when morphine is given freely.

We do not consider any feature of the treatment more important than absolutely to arrest all peristalsis, if possible, for a time; and on deep morphinization and withholding of all food by mouth we must depend for this most necessary cessation of the infection-spreading movements of the intestinal tract.

Complications.—We have had to wash the stomach in but two cases, and in these only a few times. I believe the posture deserves some credit for relieving us largely of this very irksome duty, and the patient of a most trying ordeal, as it seems to help prevent

gastric distension, which, I believe, is rather favored by the Fowler position.

Enemas have been used twice daily after the third day, and no purgatives have been given to any of these patients at any time.

Enterostomy was not done at the original operation in any case, although we found in six cases enormous distension of the bowels. We believe enterostomy done at the original operation is more dangerous than beneficial; and we advise against it until definitely indicated.

We have had but one post-operative obstruction, in which case we did an enterostomy on the sixth day. The patient, a woman, made a most satisfactory recovery, and is well today; the enterostomy opening closed spontaneously.

We have had but one hernia come back.

CONCLUSIONS

Whether or not to operate on this type of case has elicited much long and bitter discussion; but it is not my intention to make any effort to settle this question, though I must say, after looking into the abdomen of these cases, I could not advise a waiting attitude, trusting nature to wall off or overpower the violent and extensive pathology found.

The picture was absolutely convincing to me; and I believe the focus should be removed, and the proper treatment instituted when the patient is seen, whether it be the first day or the fourth day. I cannot believe all these patients would have recovered had they been palliated—or even drained.

We may not be able to repeat our good record, and future work may reduce our percentage of cures.

It could be charged that this treatment is analagous to the old-fashioned shot-gun prescription; but when it is remembered that these patients come to us with their vitality and resistance seriously impaired, it

seems to me we are justified in using whatever we have found by experience to be trustworthy.

This series of 21 cases is probably not a sufficient index on which to base conclusions; but inasmuch as we have heretofore lost about 10 per cent of such patients, and had no deaths in this series, I feel that we are justified in bringing the subject before you for your consideration and discussion.

DISCUSSION OF THE TWO PRECEDING PAPERS

Dr. E. M. Sala (Rock Island, Ill.): I wish to relate one case which is not exactly a hernia, but following a laparotomy for pus, where we used wide-open drainage, a fistula developed and persisted for six months. This patient returned six months later to be operated on, but before the operation was done he had a severe coughing spell and forced out a loop of bowel. The attending physician succeeding in getting it back, and the fistula afterwards remained closed.

Dr. Clifford U. Collins (Peoria, Ill.): I was glad to hear Dr. MacLaren say that 80 per cent of these fistulæ recover without operation. About twenty years ago, when I first began surgical work, I opened a pelvic abscess through the vagina, and the operation was followed twenty-four hours later by a fecal fistula. I was young in the work and was much disturbed as to what to do. I wrote eight or ten of my surgical friends to know what to do under the circumstances. I received several courteous replies, one of them asking how in the world in opening a pelvic abscess I cut a loop of bowel while doing it; but Dr. E. C. Dudley, of Chicago, wrote me a kind, fatherly letter, and told me that I would find in a book of his on a certain page a history of a similar case, and he also gave me the comforting advice that this fistula would undoubtedly close within four weeks without any further trouble. His prognosis was correct, and it did close. I never forgot his kindliness in the letter he wrote me.

I think rather more than 80 per cent of these fistulæ close without any further trouble. It is true that, if they persist longer than two or three months, an operation for closure is required. Only once have I found it necessary to operate for the closure of a fistula in which a loop of bowel was caught close to the abdominal wall and lined with mucous membrane, and that required closure. In a fecal fistula fol-

lowing an appendectomy which persisted I finally operated, and found a hard cicatricial ring around the opening in the bowel, which required excision of that ring and the closure of the bowel.

Dr. A. W. Abbott (Minneapolis, Minn.): Among the most important fistulæ that occur are not those that open outside the abdominal wall, but those that open into some viscus, more commonly the bladder. Those are the most difficult to manage.

It is a curious fact that, in several of the cases I have observed, the contents of the intestine tend to flow into the viscus, and not vice versa. The bladder will retain its urine. In a recent case, the patient being still in the hospital, I examined with the cystoscope, and found there was a sort of valvular closure in the bladder, which apparently prevented the urine from flowing back into the rectum. That I have observed in several cases.

The first case I ever saw was while in a hospital in New York, and a diagnosis of the condition was made from finding meat particles in the urine. These cases, while difficult, can be cured. The condition is usually this: There is a fecal fistula, then an abscess, and an opening from the abscess into the bladder; and, if you establish free drainage of the abscess, both the fistula in the bladder and that in bowel will close.

Dr. Daniel N. Eisendrath (Chicago, Ill.): Dr. MacLaren, in beginning his paper, spoke about the advisability and the advantages of enterostomy in cases of ileus. I believe we do occasionally save a patient from ileus by enterostomy. It is very essential to know what we mean by the word ileus. There are two varieties which we encounter in postoperative cases, one septic ileus and the other paralytic ileus. I have some doubt as to the efficacy of enterostomy in real cases of septic ileus. My experience has been that we only empty the loop of bowel where we create a fistulous opening, but we have very little influence upon the loops above that.

In paralytic ileus there are many non-operative resources we can employ before resorting to enterostomy.

I was very much interested in the statement that 80 per cent of these fistulæ followed appendiceal abscesses. Increasing experience has shown us that we are a little less rough in handling the cecum in cases of appendiceal abscess than we have been in the past. The method which I have been using more and more in these cases, especially if the abscesses are retrocecal, as many of them are, is not to bother taking out the appendix at the tip, but to begin at the base and work

towards the tip. I believe that by so doing 70 per cent of patients that would otherwise have fistulæ are spared by this method.

A second factor in the production of fistulæ in appendicitis is in using rubber drainage-tubes, which invariably cause pressure necrosis. We should employ rubber dam in the form of the Penrose wicking.

In regard to the tuberculous fistulæ, I have had great success in closing them by the use of the *x*-ray, applying deep therapy, which has greatly hastened their healing.

In regard to some of the questions brought out by Dr. Sanders in his paper: He states, among other things, that twenty or twenty-one cases are not sufficient for one to draw any definite conclusions in regard to any method of treatment. I think we have all thought as Dr. Sanders has, that, when we have a series of successful results we are apt to be overenthusiastic over this particular method. We may have a successful series of cases by one method of treatment, and then possibly in the next series of ten or more cases by the same method we are not so successful, and so we begin to doubt the efficacy of this or that method, and conclude that it is wrong.

Knowing what iodine will do inside of the peritoneal cavity in the way of causing adhesions, I am very much opposed to its use indiscriminately. The doctor used a term which I think is the proper one to use for these cases, namely, a "spreading peritonitis." When I reported 60 cases of general peritonitis, about two years ago, I was asked several times what I meant by using that term. They said I did not know what I was talking about. They said it is not general peritonitis, and they asked the question, Are you sure the pus was under the diaphragm or in the upper abdominal cavity? I do not know, neither does Dr. Sanders know. It is better to use the term "spreading peritonitis," and iodine cannot get access to more than three or four inches of the peritoneal cavity, and that is why, it seems to me, the benefit has been from some other method.

I want to commend especially the use of the McBurney muscle-splitting incision in these pus cases. Formerly, I opened them through a right pararectal incision, and I think in almost every case there was a spreading infention in the abdominal wall, and several patients died from this cause after they had recovered from the peritonitis itself. Since that time, in every case I do my work through a McBurney muscle-splitting incision.

I do not like the method of drainage described, that is, inserting a tube across into the pelvic brim, whether he drains in the Fowler position or not. I do not think it works nearly as well as the VanBuren Knott method of suprapubic drainage. In the first place, a tube placed across the iliac vessels into the pelvis has been more than once the cause of a fatal hemorrhage. We can secure more effective drainage from a suprapubic stab-wound.

As to the necessity of draining along the outer side of the cecum: We know the frequency with which subphrenic abscess will surprise us, and carry off a patient before we have had time to make a diagnosis.

The essayist spoke about giving these patients any amount of water they want. I do not agree with him in that respect. I do not think we should give these patients all the water they want. I strongly warn nurses against this, and in the post-operative treatment of general peritonitis or of spreading peritonitis, on account of the danger of an acute dilatation of the stomach. The stomach is more or less paretic, so that every portion of the gut will become dilated. You may get symptoms of pressure up under the diaphragm, and lose your patients from acute dilatation before you recognize it.

In regard to acidosis: I think we accomplish just as much by giving six ounces of tap water containing 5 per cent bicarbonate of soda, and two per cent glucose every four hours by the rectum.

Dr. Jabez N. Jackson (Kansas City, Mo.): The main object of these meetings is to get the expressions of opinion of different men and their experience, and some of the points advanced in these papers are interesting when compared with my own personal experience.

In the first place, I would like to re-enforce what the doctor has said, and what has been brought out by one of our members (Dr. VanBuren Knott), and that is, never to operate on a case of appendicitis without taking the appendix out, as we get a large decrease in mortality from pursuing that course, contrary to what might be expected, and likewise we very decidedly decrease the probabilities of fecal fistula, spoken of in the first paper. I have in many cases in the past dug around and put in a large drainage-tube and let a necrotic mass of appendix slough out and got a fecal fistula. In other cases we may find the base of the appendix normal, and, if we cut down to the base and ligate it and cut it off and get

rid of the sloughing material, we avoid a fecal fistula and decrease the mortality, in my experience.

In the second place, I believe in every case of operation, particularly in these acute diseases, a great deal of time is spent by the operator in endeavoring to peritonealize the raw surface exposed at the base of the appendix. It is astonishing how the cecum will get back peritoneum to cover the raw surfaces, which tends to decrease the danger of fecal fistula.

Within the last three or four years I have not experienced such a thing as a fecal fistula, whereas it used to be quite common in the preceding days.

A third factor: Contrary to the statement of Dr. Sanders, the use of linen in these cases for suture material is very important. I do not use linen where there is infection of this sort because of a frequent experience I had in the past. Under these circumstances we get infected foreign material, which will keep up a discharge that is not necessarily due to a fecal fistula, but to a prolonged sinus discharge until you go back and get the foreign material out. Some of these cases are not instances of fecal fistula at all, but are sinuses due to leaving in some foreign material. It is silkworm or chromic gut; sometimes it is a fecolith which has escaped prior to the operation and which is not recognized by the operator, and which later on turns out to be so.

I have had some interesting cases of retrocecal appendicitis which were drained through the loin; and, incidently, I want to call atention to the fact that in many of the cases that are not recognized as retrocecal appendices, there is a retrocecal accumulation of pus, and, if these cases are looked for and an incision made sufficiently large through which to carry a large tube and drainage is established through the lumbar space, we do away, in my experience, with the development of subphrenic abscesses. I have not seen a subphrenic abscess in a retrocecal appendix in the last five years, since I have drained posteriorly, although prior to that time I saw them not infrequently.

Another point is this: I do not use a hard rubber tube for drainage where it comes in contact with the gut wall. In most instances, if we get drainage close to the seat of infection, we accomplish what we want without danger. In most instances I use nowadays cigarette tubes. I take a cigarette tube, and make a counter-puncture and carry it into the pelvis close to, but not against, the gut. In some cases it is totally unnecessary to use any drainage; and in the early cases

of appendicitis where you find a marked exudate, they can be closed up without drainage. It is simply a peritoneal exudate, and nature will take care of it. We want sufficient drainage for the material to get out.

With reference to fecal fistula: We should distinguish between true fecal fistula and fecal sinus. As a matter of fact, we use the term fecal fistula indiscriminately to represent anything from which there is a discharge after a variable length of time. It takes a considerable time for a true fecal fistula to establish itself. It must have mucous membrane, not in contact with the skin or epithelial covering from the outside, but inside, and it will be permanent until extirpated. In the case of a sinus we get spontaneous closure if we treat the sinus properly. If we irrigate these sinuses they will persist for a long time; the granulations will take up an enormous amount of fluid, and the sinus will not heal. If you do nothing to flush out these sinuses or fecal fistulæ, in most instances they will close spontaneously, fully 80 per cent of them, as the doctor has stated.

Dr. John L. Evans (Wichita, Kan.): I have been very much interested in Dr. Sanders' paper. The use of iodine is somewhat startling to me because we have been taught to protect the intestine from the skin that has been prepared by iodine; otherwise, in handling the cases that come to me, I follow his technic in almost every detail. The removal of the appendix at the primary operation is very important, and is practiced almost exclusively.

As to the necessity for extensive drainage: One rubber tube placed to the outer side of the cecum and another tube down into the cul-de-sac give the best possible drainage. The administration of sufficient morphine to keep these patients quiet, and reduce their respiration, is very important.

Within the last week a patient came to me whose case seemed hopeless. He was hiccoughing until you could hear him all over the hospital. He had a subnormal temperature; his abdomen was greatly distended; there was constant regurgitation of dark material, almost fecal in character. His bowels had not moved for several days. He was in the sixth day of his trouble. He was very tender to pressure over the entire abdomen. He was taken to the operating-room, and under local anesthesia I made a right rectus incision and removed a perforated appendix. We gave him a quart of normal saline solution substantially while he was on the table. One drainage tube was placed to the outer side of the cecum,

and another down into the pelvis. The wound was closed, and the patient removed to his room and put in the Fowler position.

He was given tap water by rectum and nothing by mouth. The stomach lavage was used every six to eight hours. When I left home he was recovering. In this class of cases we must always be on the outlook for complications. Mechanical obstruction often occurs. I have had five cases in which I had to reoperate for obstruction. Two of these patients were reoperated a second time for the same complication. The obstruction has usually been found in the ileum within eighteen or twenty inches of the ileocecal valve, and is usually produced by a band of adhesions. Very often this band simply obstructs the lumen, but occasionally the band will form in such a way as to interfere with the circulation of a loop of the bowel, and a gangrenous condition will result. This had occurred in one of my five cases, and thirty inches of the small bowel was gangrenous, and had to be removed.

In those cases in which we have peritonitis, nobody can tell how diffused the trouble is. I have had two cases very recently where all the intestines that I could see were greatly inflamed. From the clinical history, I am inclined to consider them as near general peritonitis as any case one could observe.

Dr. C. H. Wallace (St. Joseph, Mo.): Probably no subject has been written about and talked about so much as the perforated appendix, and yet the subject is always a new one. It is not very long since Ochsner promulgated his theory that all inflammations of the appendix, as elsewhere, require absolute rest and fixation if we would effect a cure. This was an advanced thought by a surgical master, but the theory of Ochsner has cost a great many lives; yet it was a step forward, and enabled the profession to reach its present status in treating perforative appendicitis. Most surgeons have applied the Ochsner treatment after operation instead of before it. I do not know about the young men, but there are a few of the older men who still adhere to the Ochsner treatment previous to the operative procedure. Surgeons realize the sequelæ from perforated appendicitis were so far reaching that it was necessary to remove the organ and get rid of the focus point of infection, and then apply the Ochsner treatment, if we would avoid the sequelæ and get the lowest mortality, as advocated by the essayist. The essayist's paper is along the line of what is generally practiced by surgeons of

experience. I want to say this, however, that such a paper read to a body of general practitioners would be somewhat dangerous. It is all right to read it before a body of men of this kind, who are experienced surgeons, but to the men who operate occasionally the advocation of removing the appendix in all cases is a dangerous procedure. The mortality would be increased rather than lessened; but, as our experience increases and we learn more and more to recognize with our fingers the conditions that exist and can get the appendix out without damage to the intestines, or without stirring up the inflammatory processes too much—upon that depends our lessened mortality, and the probable lessened mortality of the essayist of late, is based on a wider experience. We all realize that we can handle cases of perforated appendix with much less mortality today than ten or fifteen years ago.

As to the question of drainage: We all have our ideas about it. I believe the appendix should be removed with as little damage as possible, and I do not agree with the essayist in saying that we should pay very little attention to the damage we may do in its removal. The man who with trained fingers can get out a perforated appendix with the least damage and in the quickest time, is the one who will have a low mortality. I think the kind of drainage is a matter of individual choice. After I get the appendix out, two or three cigarette-drains will answer the purpose better than tube-drainage. We have all had cases of fecal fistula as a result of pressure from tube necrosis, and the cigarette-drain avoids this danger.

As to pouring iodine and alcohol into the wound or into the peritoneal cavity; I have never tried it. I have frequently mopped the area where the finger has worked with one-half per cent iodine, and then put in drainage without much fear; and especially does this have a good effect in those cases mentioned by Dr. Eisendrath. Where we have soiled the abdominal wall in the removal of a gangrenous, perforated appendix, we can put iodine along the field external to the peritoneal cavity with safety, and avoid infection of the external abdominal wound.

I agree with what Dr. Jackson said in reference to drainage. I have frequently made a puncture wound in the median line, and put a small cigarette-drain into the pelvis, which can be pulled out the second day.

One point the essayist did not go into particularly is the method of getting rid of the pus or fecal material that may

have escaped into the general abdominal cavity. I think we do great damage by trying to get rid of this by mopping down and pushing gauze over the inflamed coats of the bowel, for trouble always comes afterwards. I have an old vaginal glass speculum which was given to me by an old practitioner, who has quit practice, and I frequently in these pelvic cases push it down to the bottom of the pelvis and mop out what is in the pelvis through this speculum, and thus avoid any damage to the peritoneal covering of the bowels. The suction method from the water faucet is an excellent and safe way to get rid of this material.

Dr. James F. Percy (Galesburg, Ill.): I have had in mind for a number of years the reporting of my results in these cases that Dr. Sanders has spoken of, but he anticipates me in a way. I have had a larger number of cases than he has, and my technic is practically the same as his except that I use only rubber dam for drainage. I tuck rubber dam in everywhere, and leave it until I get merely a serous discharge. I cannot appreciate the courage of the man who in a local septic peritonitis or general peritonitis case will pull the drain out at the end of forty-eight hours. I leave the drains in until the patients are absolutely safe, as I have had the experience of pulling them out too soon and then having to re-operate. The rubber dam does not produce fecal fistula, and I am convinced the patients do a lot better as a result of its use.

Another point is with reference to the prognosis in cases that have a full bladder. In every patient who cannot empty his bladder, the prognosis is much better than in the case of the patient who can, for the simple reason that the disease is often expending itself in the lower part of the abdomen. Those cases are safer than those in which the bladder gives no trouble.

I do not give very much morphine. I was brought up in New York under the old teaching that morphine would save peritonitis cases. It undoubtedly can do so, but in these cases my routine treatment is a hypodermic of sterile cold water, and it is gratifying to see how soon patients will respond to it, and, if they still complain and throw themselves around, I give them one-sixteenth of a grain of morphine, and that is usually all the morphine that they need.

There are a few things back of all our successes by the various methods. I never give a purgative to an abdominal case until the patient spontaneously passes flatus. When a patient does that, I know it is safe to give a cathartic. I have

seen quantities of salts given in order to get the bowels to move early and which made the patients very sick.

Another thing that is exceedingly valuable in those cases is large doses of strychnia. I mean by large doses one-eighth grain hypodermically as my first dose, followed in three hours by another hypodermic of one-eighth grain. The first one-eighth will usually stir up borborygmus; and the second one-eighth, if there is any chance of moving the bowels at all, will make them move. You do not have any trouble with it in the majority of cases. I have never seen the physiological effect of strychnia obtained by a hypodermic given in this dose in this type of case. I have used it a sufficient number of times to know that it is safe. However, pituitrin will probably remain the agent of choice with the majority of surgeons where over-distension of the gut is feared.

Just a word or two in reference to the removal of the appendix: Dr. Eisendrath made a valuable suggestion when he told us, if the appendix is buried, to separate it at its base, and then to get it out by blunt finger-dissection. It is unwise to attempt to cover in the stump of this kind of appendix; it is better to crush it off at the base and tie with No. 0 chromic gut, and leave it surrounded by a small strip of rubber dam.

Dr. B. Merrill Ricketts (Cincinnati, Ohio): As to the use of iodine in the peritoneal cavity: I am not guilty of using any antiseptic or solutions in the peritoneal cavity. At our laboratory during the last three years, experiments by Wilms and Dr. New on dogs have been carried on by introducing various solutions of iodine into the peritoneal cavity, using such strengths as have been used in the peritoneal cavity of human beings, and adhesions have always followed. The surgeon who uses iodine in the peritoneal cavity does not check up his work by an autopsy to see what the results are.

As to the question of ether in the peritoneal cavity: While the dogs will live for a while, when they die open them up and a horrible condition is found, everything is found adherent.

Dr. Sanders will probably recall the name of the gentleman who read a paper at Lexington, Kentucky, some six or eight years ago, in which he reported several hundred cases in which iodine was injected into the peritoneal cavity. In order for Dr. Sanders to determine the fact and convince himself of the injurious effects of these agents when introduced into the peritoneal cavity, it is necessary for him to experiment on animals, and, if he does that, he will soon be convinced.

Iodine or formalin, in any per cent, ether or chloroform, with a usual percentage of alcohol, will destroy the epithelium, and when you destroy the epithelium you can draw your own conclusions as to what follows.

Concerning gangrenous appendicitis: I operate on many of these cases under local anesthesia, with as free drainage as possible. I see a great many more cases of gangrenous appendicitis in the homes of patients and operate on them there than most of you unless you are doing a great deal of rural surgery. Much of my surgical work has been done in the homes of patients, and my percentage of successes has been as good. I have not had a patient die within the last six months, except one patient who had a gangrenous cecum and ascending colon, who died at the end of the fifteenth day.

Finally, I would urge you to avoid the injection of these agents into the peritoneal cavity. They produce extensive adhesions; and, if you wish to be thoroughly convinced of that fact, make a series of experiments on dogs.

Dr. MacLaren (closing): I do not think we have had a fecal fistula following an ordinary laparotomy in the last five or six years. most of the cases I have been reporting are old cases which date back a long time.

Dr. Eisendrath misunderstood me when he thought I said 80 per cent of these fistulæ followed appendiceal abscess. Twenty-seven, or practically one-third of the cases, were associated with appendiceal abscesses; about an equal number followed operations on ovarian abscesses; and the rest were scattering. Our experience with the cross-muscle incision in acute appendiceal abscess is that we have had two intense phlegmonous infections of the whole abdominal wall, in one case extending to the back; and both of these patients died. After that we gave up the cross-muscle incision in acute cases. An incision through which you strip up and open the fascial planes is more dangerous in these bad appendiceal-abscess cases than a straight clean incision, and the establishment of drainage after the manner recommended by Van Buren Knott, namely, to drain through a suprapubic stab, is better, in my judgment, than to drain through a cross-muscle incision.

A REPORT OF FURTHER EXPERIENCE IN THE USE OF ETHER IN PERITONITIS AND OTHER INFECTIONS

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A cursory review of the literature on the intraperitoneal use of ether in patients suffering from peritonitis will show that a preponderance of the evidence bespeaks its beneficial influence.

M. Soulingoux (Semaine médicale May 13, 1914) refers to a method of treating septic peritonitis by the introduction of ether into the peritoneal sac, as proposed by Morestin, Bull. et Mem. Soc. de chir. de Paris, February, 1913, and Temon in the May, 1913, issue of the same journal. Soulingoux practiced flushing the infected area with ether, and removing by sponging before placing drainage tubes and closing the abdomen, and he was convinced, not only that this method of using ether possessed merit, but that it had actually saved a number of patients suffering from peritonitis who would have died had not the method been employed. The fact that some of his patients died thirty hours later, and some immediately after the use of ether, did not disconcert this intrepid observer, for he had often seen death during the course of anesthesia in patients suffering from peritonitis on whom ether irrigation had not been used.

U. U. Phelip & Tartois, Annales de Gynecologie et d' Obstetrique, December, 1913, report 16 cases of

peritonitis in children due to appendicitis in which they used ether lavage with 7 deaths and 9 recoveries.

Janneret (Rev. méd. de la Suisse romande, 1913), Waterhouse (British Med. Jour., February 6, 1915), Haines (Tr. Cincinnati Academy of Med., 1915), Haines (Tr. Miss. Valley Med. Assn., 1918), and Morton (Woman's Med. Jour., 1916) have reported numerous cases illustrative of the beneficial influence of ether used intraperitoneally in conjunction with the usual post-operative treatment of peritonitis.

Waterhouse employed ether intraperitoneally in 59 patients suffering from peritoneal infections, with a mortality rate of 3.23 per cent, and he believes that the addition of ether played a conspicuous part in reducing the death-rate. He thinks that ether not only inhibits the growth of germ life, but actually destroys many of the germs and improves individual resistance by stimulation of the circulatory and nervous systems, thus enhancing the patient's chances of recovery.

For the past two and one-half years the writer and his assistants have used ether intraperitoneally on all patients suffering from peritonitis coming to operation at our hands in the Cincinnati General Hospital and in private practice. At the Indianapolis meeting of the Mississippi Valley Medical Association last year, I reported to the Surgical Section on a small series of cases wherein ether had been used in conjunction with operation, drainage, and other post-operative measures in the treatment of peritonitis. The mortality was 13.1 per cent. Since that report was made 43 cases have been added with a mortality of 9.13 per cent, making a total of 66 cases with 7 deaths, or a mortality of 10.4 per cent for the entire series.

This series includes gastro-intestinal perforations from disease, gun-fire and stab-wounds, abortion, leaking pus tubes, and tuberculous peritonitis.

In a number of the more virulent cases ether was

introduced through the drainage-tube several times during the first and second days succeeding the operation. Post-operative complications including shock, prolonged anesthesia, vomiting, dilatation of the stomach or heart, dysuria, septic thrombophlebitis, and gaseous distention of the intestines were not more frequent, severe, or prolonged as compared with similar patients operated on prior to adopting ether in the treatment of peritonitis.

In a fair percentage of the cases primary union was obtained throughout the line of incision, and the patients recovered without going through a process of sloughing of the abdominal wall, frequent dressings, prolonged stay in the hospital, and post-operative hernia and morbidity so frequently encountered in this type of infection.

Encouraged by the beneficial results obtained following the use of ether in peritonitis we gradually enlarged the field of application to other infected regions of the body,—scalp wounds complicating skull fracture, other open fractures, osteomyelitis, tuberculous abscess cavities, sinuses, broken-down tuberculous testis, abscess of the thyroid, infected lymphatics, and septic wounds of other soft structures,—with very gratifying results.

Ether used locally certainly surpasses all other methods in preparing the scalp, axilla, pubes, and scrotum for surgical procedure. We have in but one instance followed the practice suggested and followed by the late Dr. J. B. Murphy of injecting ether into an infected joint cavity after aspirating the contents. The patient had had an osteomyelitis of the femur, which had perforated into the knee-joint cavity. The result in this instance was negligible, the patient refused to submit to an amputation, and death followed.

M. Picque (Presse méd. August 19, 1915) and M. Ombredanne (Bull. et mém. Soc. de chir. de Paris)

report a large number of cases of gas gangrene wherein they had used ether after removal of foreign bodies and establishing free drainage. After thoroughly irrigating the wound with ether they introduced pledgets of lint which had been steeped in ether into the various cavities and recesses, and applied a large compress saturated with ether over the entire field. This in turn was covered with cotton and other dressings with a view to preventing rapid evaporation by excluding atmosphere. Dressings were changed twice daily, and the results were surprisingly good in that the infectious process was checked in from three to six days, although crackling and gangrene were present in some of the cases before treatment was instituted.

Dressing gas-bacillus infections in this manner is a violation of the decrees of all previous surgical experience, and the clinical results obtained by these observers furnish conclusive proof of the beneficial influence of ether, not alone in immunization, but likewise in the absolute destruction of germ life. The theory advanced by Gardner that ether and colloidal silver act by killing the bacteria or lessening their growth, thereby lessening the output of agressins, is well supported by the experience of Picque and Ombredanne.

Objection has been made to the intraperitoneal use of ether because it favors the production of adhesions. Law (Tr. West. Surg. Assn., 1914) in his laboratory experiments in the artificial production of peritonitis, washed the soiled surfaces with ether before closing the abdomen. The results showed absence of general adhesions, slight omental attachment, and a few guy-rope-like adhesions between coils of intestines. There were fewer adhesions than in the controls; and when ether did not prevent it seemed to mitigate all forms of intraperitoneal adhesions. Personal experience gained by re-opening the abdomen for ileus and other post-operative conditions has led the writer to con-

clude that the formation of adhesions is dependent upon some inherent condition in the patient's makeup rather than upon the type of infection or the use of ether intraperitoneally.

It has been the experience of every surgeon to operate in the presence of extensive peritonitis and encounter few or no adhesions, also to operate in mild infections and find extensive adhesion-formation. There are some opinions contained in current surgical literature concerning the cause of adhesions which need revision, and others which require confirmation to be convincing.

Instances have been recorded wherein disaster followed so soon after the introduction of ether as to convince the surgeon that death was due or at least hastened by the presence of ether in the peritoneal sac. Our observations lead us to conclude that, although not devoid of danger, ether has very slight toxicity when placed in the peritoneal sac. We have seen no untoward results which could be directly attributed to the use of ether in this manner. In many of our patients sloughing of the abdominal wall at the site of the drainage-tube and along the line of incision did not follow the operation; in the cases wherein sloughing did occur it was not so extensive as we had witnessed prior to the use of ether; and drainage from the peritoneal sac has not been as profuse or prolonged where ether was used. These features for betterment possess the double advantage of diminishing the necessity for frequent change of dressings and obviating prolonged stay in the hospital.

In conclusion the following points are submitted for your consideration:

1. That the local use of ether in peritonitis has been clearly proven clinically to be of material benefit in making for the well-being and recovery of the patient.

2. That ether may be safely used in peritonitis.

3. That the quantity to be used must be regulated to suit the age of the patient.

4. That the toxicity of ether when used intraperitoneally is slight.

5. That ether produces a certain degree of immunity from the ravages of toxemia for a few hours following its introduction into the peritoneal cavity, which may turn the scales in favor of the patient's recovery.

A WAR TALK

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KANSAS CITY, MISSOURI

I have no formal address to deliver to you on this occasion; in fact, I learned just before I left Kansas City, through the Secretary, Dr. Mann, that I had been requested from the authorities in Washington, as a member of the Medical Board, to speak to you relative to the subject of war.

I hesitate to attempt anything in the way of a formal address before this body because its members know just as much about the subject as I do. I hesitate, further, because I know how patriotic the members of the Western Surgical Association are and have proven themselves to be by the large number of its members who have volunteered their services. However, this is a matter which is uppermost in the minds of most of us at the present time, whether we are already in the service or not.

Curious it is how war begins, and how its operations are conducted on a large scale. We do not know where or when it is going to end, or know the issues upon which this war will be decided.

With a number of the members of the Western Surgical Association I was on the Continent when war was about to be declared. We visited in France, Germany, Switzerland, and Belgium. We were in London before there was a declaration of war. There were rumors of war. My wife and daughter were

with me at the time, and we thought of the many difficulties we might have in getting transportation to return home. I made an effort to exchange my transportation to return home earlier. When the matter came up for discussion before the men who had been in those countries, and who were familiar with what was going on, there was left in my mind no doubt of war as a possibility. Some of the gentlemen said there could be no such thing as war; however, war broke. Ever since war broke we have been wondering who started it, and why it was started. I doubt if any intelligent man knows why the war started. Of course, there are those of the so-called Allies who are inclined to attribute all the sins of war to Germany. I am frank to say, I do not believe so. As a matter of fact, at the outset of war, if anything, I was inclined to be pro-German. My sympathies were with the German people because of what Germany had done for science and for its wise men of science. We have looked upon Germany as the seat of learning and of progress in recent years, and we should feel very kindly the German spirit.

I did not believe at the outset of the war anybody knew who started it, or realized what the development of the issue of the war was going to be, and yet this war, I believe, will be decided on one fixed principle, and that fixed principle is the question whether people as individuals shall have the right to control their own destinies or somebody shall dictate those destinies. But I do not consider that that was the issue for the war originally. With Russia on one side fighting aristocracy, the contest soon began to develop into one of democracy as against autocracy; and, now the issue of war has been raised, it should appeal to the feelings of every patriotic American citizen. We have been raised in faith in democracy, where we have rights and privileges which others have not had; and when it

comes to the question of whether we expect to do our part to perpetuate these privileges to the rest of the world, there is no room for doubt. Furthermore, the obligation of patriotism rests more strongly upon those of our citizens who are German-born than upon the native American. Men of German extraction came to this country for the reason that it is a better country to live in. They came to America to avoid oppression and to seek the land of plenty and of wealth. We have extended to them a broad sympathy and have received them, so to speak, with open arms.

This war has been waged upon a principle with which every one must agree. A second thought is that we are entering upon a war that is fraught with tremendous import to the world, and one that is not going to be of short duration. There have been optimists who have said that this war could not last long as the financial interests of the country would not permit such a thing—that we could not afford war. The experience of the world is that when men are ready to fight, a fight follows. As I see it, this war is likely to be of long duration. Let nobody think for a single moment this war is going to terminate in rapid dissolution of the strength of our enemy. The Germans are a resourceful people, trained to live on less than other people, and to conserve force and develop force; and the Germans still have supplies in abundance. We, therefore, have no reason to expect any sudden collapse of Germany on account of lack of material existence. Any one who thinks that this war is going to collapse or suddenly end in a revolution within Germany, knows nothing of the German people, because there does not exist today or at the time of the war any people on the face of the globe who are more loyal to their government than the German people. There will be no successful revolution in any country unless that revolution is endorsed and backed by the brains of the country.

Many of you know something of the method by which the authorities in Germany stand by intelligent people. For instance, in medical education, every medical institution, every university, is under government control, and the ability of every man, from the highest to the lowest professor, is recognized. They signify their faith in him and honor him. It is this spirit that binds men to the government. You as individual American citizens do not have that privilege. The German is rewarded for any valuable or original scientific research he may have done. His work is appreciated. The government recognizes and rewards scientific merit. Let us take, for instance, a chemist in this country who, in experimenting with drugs, discovers a drug that is of great value to mankind. The chances are that he may not receive any recognition for it from the government, but some manufacturer comes along and pays him a certain sum of money for his discovery, and the poor fellow does not receive the recognition that he deserves. That is not the German custom. If a poor German does something of value for science, or makes a discovery that is of material value, he is singled out by his government and receives proper recognition for what he has done. The government confers a title on him, showing that it appreciates what he has done. Such a system develops such patriotism and loyalty on the part of the people that no man can expect any sudden collapse of Germany on account of an internal revolution. It will not come. The possibility of any sudden cessation of the war on account of lack of means, power, or sustenance, or on account of internal revolution, is simply the dream of an idler who knows nothing about the German people. The fact, however, is very apparent to us that we are now engaged in a war which will tax the resources of every man, woman, and child; and the question arises

and appeals to us individually, what can I do? We as medical men must play an important part in this war. Never before in the history of the world has it been realized as it is today that the success of the war depends upon an intelligent medical service to care for the soldiers. If we are to win this war it is absolutely necessary for the members of the medical profession to see to it that the largest number of men are in the best physical condition, with every resource back of them, and that these men must be kept in good physical condition.

It has been estimated by those in authority that our resources in munitions must be on a gigantic scale, and that our reserves in men must be ample. A large number of medical men will be required in these critical times to serve their country. It is estimated that 22,000 medical men will be needed for the medical service of the United States Army in this war. There are probably 62,000 physicians in America, graduates of schools that really do not deserve the name of medical schools, who are not doctors in any sense to be of service. When we eliminate the incompetent, the improperly educated, we have probably 80,000 medical men in this country who are available for army material. Of this 80,000 medical men we must consider the number that would be exempt on account of physical disability, and we are asking for 22,000 men. There are 16,000 medical men who already have commissions in the Medical Reserve Corps of the army. The medical profession of America has done splendidly in the voluntary response of its medical men in this great cause. There is no other class concerning whom so much is expected as medical men. When the time of trouble comes, the first man wanted is the doctor. When a member of your family is sick you want a doctor, and when the country is sick you want a doctor. When a man or woman is sick the country

doctor is called, it may be, ten miles across the country to look after that individual. The 15,000 men who have joined the Medical Reserve Corps have given up their practices; they have given up what took years to develop, to make homes for themselves, and yet, after all, war is not an unmitigated evil. In times of peace the spirit of the people is the spirit of production, of acquisition. In the business world, in times of peace, the standard of success is the American dollar. I think it is a mistake to measure success by dollars and cents. But in this country we have gradually developed that commercial spirit which is measured very largely by dollars and cents. The people abroad have undestimated the real fundamental factors of Americanism. They believe that we are so absolutely absorbed by the commercial spirit, so hungry for dollars and cents, that we would never give up our luxuries and sacrifice our comforts for any cause on the battlefield, and the members of the medical profession have always been first to make these sacrifices.

We probably have enough medical men to look after the people; but before this war is over, if there are at least 5,000,000 of the men of America in the war, as is estimated by some, we shall need more medical men at the present time to take care of the next additional 500,000, to say nothing of those who have already been accepted. I put the question up to you.

After having been brought into intimate contact as a member of the Medical Board with members of the Advisory Board at Washington, I am proud to say that great things are being done there. When I first went there I was somewhat in doubt as to whether things were being done in the right way and on right principles, as they should be, but, after seeing the inside, after seeing how the medical profession was run in the Surgeon-General's office, with his efficient corps of assistants, I was not only amazed at what was

being done but at the efficiency of the organization. No man who has talents need have any fear whatsoever that his talents will not receive recognition from the Surgeon-General and his corps of assistants. I am proud to see men like William J. Mayo serving in an advisory capacity in the surgical department, and men like Welch and Victor C. Vaughan acting in a similar capacity as internists, giving up their time to go to Washington to advise and give their opinions to the Surgeon-General and his staff.

They are developing specialism as far as possible. They can make every man an absolute specialist. There we have the most intelligent direction of the medical service that can possibly be had.

Lastly, as I have said before, war is not an unmitigated evil. It is the spirit of manhood which shows sacrifice, a willingness to give up selfish desires and to sacrifice one's future for his country, that constitutes true manhood. Of course, we all recognize the obligations that a man owes to those he has brought into the world and the woman he has married. There are those who cannot go, and yet are patriotic; there are others who want to go, and ought not to be allowed to go. But the final issue which should appeal to us is this: Here comes the demand of our country in the greatest conflict the world has ever seen, upon which our destinies rest and the destinies of mankind for the future rest. Here am I, send me. (Applause.)

THE CONDUCTION OF HOSPITALS

RICHARD W. CORWIN, M.D., F.A.C.S.

OMAHA, NEBRASKA

The subject, as given to the writer, is broad and exhaustless, and can be treated in the limits of a paper only incompletely. All who are interested in hospitals are anxiously awaiting the report of the committee appointed at the meeting for Standardization of Hospitals, held in Chicago on October 19 and 20, 1917, at which the following problems were presented for discussion:

1. "What is the hospital problem of today and what are hospitals actually doing for the sick?"
2. "What has medical science a right to expect of the hospitals that they are not now doing?"
3. "How are these results to be obtained?"

It was hoped that the report of the Standardization Committee would be submitted before this meeting. To anticipate this report would be presumptuous; however, there is nothing left for the writer to do but to offer a few suggestions, trusting they may not seriously conflict with those to be proposed by the Standardization Committee.

After accepting the invitation to present a paper upon hospitals, the following inquiry was addressed to a hundred prominent physicians, surgeons, and superintendents associated with hospitals:

What would you suggest as the most important improvement that can be made in the hospital of today?

About fifty replies were received, and among the answers are the following suggestions:

The Staff:

1. Improvement in the character of the staff.
2. Increase the number of paid men on the staff.
3. Exclusion of incompetent men from operating.
4. Re-educate the doctors. Some doctors have been so long in charge of hospitals, they think they own them, and that they are run for the benefit of their managers.
5. Doctors should practice what they preach regarding cleanliness.
6. A professor of efficiency to teach doctors and nurses so they will not waste 50 per cent of their time.
7. Better co-operation between members of the staff.
8. All members should exercise initiative.
9. The hospital will give to the sick what the doctor demands.
10. A hospital will be just as good and no better than the staff.

Laboratories:

1. More skillful and better paid men in charge.
2. Better equipment.
3. Development of services in clinical pathology and of oral instruction for internes.
4. Chemical laboratories for making and testing chemical substances used for patients.
5. A hospital without a scientific department is not a hospital, but merely a sanitarium.
6. A laboratory which conducts examinations of urine and blood only, might just as well be abolished.
7. An *x*-ray department that takes only bone-pictures loses nine-tenths of its opportunities.
8. All real laboratories are open the whole of the twenty-four hours of each day.

General Suggestions:

1. Hospitals should do more teaching.
2. The internes should receive more instruction from the staff and in the laboratories.
3. Limitations of the use of hospitals to operators of known ability and standing.
4. Economy in the operating-room and elsewhere.
5. Elimination of waste space, decreasing labor and expense.
6. Constructed at lowest cost and greatest efficiency.
7. Flake, mosaic, or "arrazzo" for floors, which are easily cleaned and never need redressing.
8. Economize so that more of the middle class may take advantage of the hospital.
9. Gas and water pipes should be put in accessible flues.
10. Wiring providing for drop-lights, fans, and other electric appliances.
11. More effective methods of ventilation.
12. Enlarge hospitals by detached pavilions, say one hundred beds in size.
13. Centralization of medical government.
14. Re-educate the board of managers.
15. Medical executive as superintendent.
16. Trained pathologist and anesthetist.
17. Social-service work to prevent disease, disability, and disorders.
18. Posting of the full diagnoses in the operating-room in advance of operations.
19. Very much more importance should be given to sterilization. There is no method by which we are sure that a dressing has been sterilized.
20. Consideration of the patient.
21. Overworked doctors and nurses are unsympathetic.
22. Too much rush at clinics.

23. Only the highest standard should be considered in dealing with life and death, health and disease, usefulness and uselessness.

To the above excellent suggestions the writer takes the liberty of adding some points, gathered from an experience of over forty years' residence in hospitals. In 1881, the following notice was posted in Minnequa Hospital: "Who is to be considered First in this Hospital?" *The Patient.*

In the conduction of hospitals the *first* consideration should be given the patient. Let it be understood from the beginning that a hospital, whether a private, semi-private, a general, a special, an emergency, or a war hospital, exists for the benefit of the patients, and not for the convenience of the doctor, interne, medical student, or nurse.

The *second* consideration should be given to the site. The writer feels that no hospital, except an emergency hospital, should be located in a city, where it is dusty, dirty, and noisy; and that a hospital should be located where there is plenty of room for grass, flowers, shade trees, and opportunity for outdoor life.

If the hospital be of benefit to a medical school, its doctors and students, then let the school go to the hospital instead of the reverse—consider patient first.

The *third* consideration should be given to the plans of the hospital buildings. If a hospital be located to the best advantage, it has been found that buildings of one or two stories have advantages over those of many stories. In such a building the construction is less expensive and, for service given, more economical to maintain.

The plans should call for fireproof construction, with the elimination of the elevator, which is noisy, expensive, and, in case of fire, dangerous. The inclines should have a grade one foot in six, thus meeting every demand of the elevator or stairs. They ac-

commodate every class of ambulatory patients,—old, young, stout, weak, or crippled,—and are convenient for moving wheel-chairs, stretchers, or beds, and, in case of fire, are the safest.

In place of an elaborate front and entrance, expensive board meeting-room, and showy corridors, let the wards and lower-priced rooms be better furnished and decorated.

Cork carpet, varnished, or painted and varnished, has proven durable, noiseless, not slippery or cold, and comparatively easily cleaned.

If cleanliness of the operating-room floor and walls be deemed essential, let sheet lead be considered for floor and wall covering. It is durable, and withstands the direct application of live steam.

The *fourth* consideration should be given to the comfort and safety of the patient.

Dirt, noise, and odors should be eliminated as far as possible.

Sterilization should not be considered in connection with an operating-room only, but, as well, with the culinary department.

Preparations against infection in the operating-room are thorough; in the kitchen they are sadly neglected.

More attention should be given to the cleanliness, sterilization, if you please, of food, cooking utensils, table ware (knives, forks, spoons, plates, cups, glasses, etc.), of table-linen and dish-towels, of cooks', waitresses', and help's clothing and hands.

The elimination of carpets, large rugs, window roller-shades, and decorative drapery in rooms and wards.

Ventilation, in addition to the indirect, forced draft or fan, which is inexpensive and of decided benefit to the patient and comfort to the nurse, may be obtained by providing an inside awning, fastened to the window and dropped at will over the head of the bed and

patient, leaving the body in a warm room. If properly arranged, the patient has the benefit of outdoor air, and is protected from draft and storm.

Loud talking or laughing by doctors, nurses, visitors, or patients, should be prohibited.

Noise from the slamming of doors, dropping things, or swishing of over-starched skirts, can be and should be minimized.

Odors from medicines, drugs, or chemicals that are useless or not essential, that is,—iodoform, lysol, etc., —or from general or diet kitchens, or from lack of ventilation, are inexcusable.

Smoking in a hospital, except in a room especially prepared, and that the farther away the better, should be peremptorily forbidden.

Any person who smokes in a hospital or enters a sick-room with tobacco smoke, fresh or stale, in his clothes or on his breath, should be forbidden the privileges of the institution.

Better team-work.

Better laboratory work.

Better case-work.

More scientific medical and surgical work.

More authority given to the superintendent.

One head, and eternal vigilance.

Patiently we await the detailed report of the Standardization Committee, but in the meantime and all the time, remember and never forget, the first thing to be considered is the comfort, safety, and welfare of the patient.

DISCUSSION

Dr. George N. Kreider (Springfield, Ill.): Dr. Corwin has opened up a large subject in the matter of hospitalization. I am inclined to differ a little with him as to the number of medical men in the service of the army. If we have 5,000,000 troops under arms in the course of the next two years, it seems to me probable that, instead of having the 20,000 medi-

cal men he mentioned, we are likely to need 50,000 men, and the number of medical men left at home to care for 90,000,000 people is going to be very inadequate. Then the matter of the hospital will be very pressing. I think we shall have a larger number of medical men than Dr. Jackson has stated. We shall have 60,000 or 70,000 to take care of 90,000,000 people. Even so, it will put an immense burden on these men.

Now, to my mind, the solution of this great burden is to get the people into hospitals, and that will be accomplished by good roads and automobiles. This is being done now in a great many communities. Country doctors even now are bringing patients into hospitals, and they are treating them there. These patients are much better off in hospitals with good nursing than they would be if the doctors were riding all over the country to see them. It is, I believe, the experience of surgeons that going to the country to operate is a thing of the past. Patients are now brought to hospitals almost exclusively. Personally, I do not believe I have done an operation in the country away from a hospital in the last five years. There is a greater willingness of people to go to hospitals for operation. A large number of doctors will specialize, and require laboratories and *x*-ray apparatus where they never had them before.

I wish to speak briefly of another thing. My business for the last seven or eight months has been examining medical men for entrance into the Medical Reserve Corps, and during that time I have learned a good deal about doctors. For the first seven months I was compelled to reject about 15 per cent of the doctors coming to me. I reported this to Dr. Simmons, Editor of the *Journal of the American Medical Association,* and he refused to publish it, saying it was a very startling statement, and that it ought not to go out. I made a thorough canvass of the matter among other examining officers as to their statistics of the percentage of rejections, and I found they were rejecting on an average of 20 per cent; in some instances the percentage was as high as 35. So you see my percentage of rejections was quite low. I will tell you, briefly, why we rejected so many doctors.

We found a very large number of physically imperfect men. Dr. Corwin spoke about the use of tobacco. I am glad he did, because we found a very large number of doctors who came up with bad hearts for examination, due in all probability to the frequent use of tobacco. The question of tobacco is one that has got to be considered. It is useless anyway, and, inas-

much as it does not do any one any good, it must necessarily do more or less harm, and it is going to play an important factor in the physical examinations of our medical officers and men. Personally, I do not like tobacco. I gave it up twenty years ago on account of its being injurious to my health. Medical men should in this crisis review their method of living, and cut out bad habits of all kinds, not only for the sake of themselves and their families, but for the sake of the community in which they necessarily will play so important a part.

Dr. W. A. Dennis (St. Paul, Minn.): It seems to me there is one thing at the bottom of the hospital situation, and the rest of it will come along when that is provided for, namely, improvement in the hospital records. If we require every man to keep a complete record of his cases, and have a standardization committee or a visiting committee to look into these records from time to time to see what kind of records they are, the rest of it will come. A man will be ashamed to admit that he has not made a proper examination physically; that he has not made an *x*-ray examination when it was required; and these omissions a proper record would show. That is the secret of the whole thing, and the first thing to be demanded.

Dr. James F. Percy (Galesburg, Ill.): Dr. Corwin's policy is both interesting and valuable. I venture to suggest that the most important thing in the conduct of the average hospital is the superintendent. As the average hospital throughout the country is run, everything is decided by the superintendent, and the superintendent is usually a trained nurse. She has had no previous training before entering the hospital for the position of superintendent, as a rule. If she comes from a training-school that has had high ideals of what a hospital should be, that woman brings up the hospital to a higher standard than it was when she reached it. Unfortunately, however, that is the exception. If we are going to catalogue the things that a hospital needs, it seems to me that this is one of the most vital of things, because the average hospital throughout the country is not conducted by a superintendent who has had any previous training. She may have come from a home where her ideals were on a low plane, and she may have been trained in a school where the ideals of her teachers were not very great, and, as a result, the whole hospital situation in this country is kept at a low level—at a lower level, I might say, than it would reach if we had some system by

which we could get in these institutions men or women who are trained for the work along scientific, as well as along practical, lines.

Dr. Corwin (closing): I wish to thank Dr. Kreider for his statement in regard to the use of tobacco. I feel that tobacco is a detriment and not a benefit. I understand that $10,000,000 is spent by manufacturers in advertising. This probably is not altogether for the benefit of the smoker. Would it not be better to plant to wheat the 1,368,400 acres used in raising of tobacco? Enough wheat could be raised on this amount of land, it is stated, to supply 10,000,000 people with the usual pro rata of wheat flour, and leave a large by-product for the feeding of cattle—all of which now goes up in smoke.

Hospitals should keep better records. It is hoped the committee will show us how this may be done.

CYSTS AND PSEUDOCYSTS OF THE PANCREAS, WITH REPORT OF CASES

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The term "pancreatic cyst" has been used to describe any fluid tumor in or associated with that organ, though such tumors differ in etiology, position, and clinical manifestations.

Cysts occurring in the upper abdomen are rare compared with cysts rising from the pelvis.

The organs from which the cysts may arise are the pancreas, the kidneys and suprarenals, the liver, and the gall-bladder.

In the differential diagnosis the following affections will be considered:

1. Malignant disease of the pancreas or of the adjacent organs.
2. Aneurysm.
3. Echinococcus cysts of the liver, spleen, or peritoneum.
4. Affections of the retroperitoneal lymphatic glands.
5. Hydronephrosis or pyonephrosis.
6. Cystic disease of the suprarenal capsule.
7. Circumscribed peritonitis with exudation.
8. Ascites.
9. Cystic disease of the ovary.
10. Hydrops of the gall-bladder.

Malignancy usually occurs in persons over fifty

years of age, although it may appear at a much younger period of life. Large pancreatic cysts are unilocular, while, if a malignant tumor has undergone degeneration, more than one cyst may be found. Hardness and irregularity of surface suggest malignancy; smoothness and regular round or oval contour speak in favor of a cyst. Occasionally, a rapidly growing pancreatic cyst may develop much more rapidly than malignancy.

Aneurysm.—An aneurysm of the abdominal aorta can be distinguished from a pulsating pancreatic cyst by its pulsations being felt in all directions, and the presence of a bruit. If the patient is placed in the genupectoral position the tumor will leave the aorta by gravitation, and all pulsations will cease. Steady pressure will diminish the size of an aneurysm, but will have no effect on the cyst.

Echinococcus cysts of the liver or spleen may be mistaken for cyst of the pancreas. A peculiar fremitus sometimes felt on palpating an echinococcus should always be sought for. Hooklets in the aspirated fluid would be positive of echinococcus cyst, while their absence would not exclude the possibility of the tumor being a sterile echinococcus cyst.

Tumors of Retroperitoneal Lymphatic Glands.—Inflammation, neoplasms, suppuration or enlargement of the retroperitoneal glands posterior to the pancreas might simulate a pancreatic cyst, but such conditions would usually give rise to serious constitutional disturbances and to extension of the disease to neighboring organs.

Hydronephrosis or Pyonephrosis.—In pyonephrosis there may be an enlargement simulating a tumor, but there is tenderness (readily elicited by percussion with the Murphy method), and intermittent fever with pyuria. In hydronephrosis, urinalysis shows usually albuminuria, oxalate of calcium, and crystals of uric

acid. The specific gravity is usually low, and the urine is generally alkaline or neutral in reaction. Cystoscopy with catheterizing of the ureters will assist in the diagnosis. Hematuria is rarely seen, except in cases of calculus. The *x*-ray should be used as routine in the diagnosis of these conditions. Tumors of the kidney usually occupy a lower place and are more laterally situated than tumors of the pancreas.

Exploratory puncture is condemned by modern surgeons in the diagnosis of this type of tumor.

Cystic Disease of the Suprarenal Capsule.—The bronze skin is suggestive of disease of the suprerenal capsule. The blood-pressure is usually low. About eight months ago I was called to see a doctor about fifty-two years of age who was suffering from severe gastric symptoms, and persistent vomiting, with a slightly bronzed hue to his skin, but no palpable tumor. On his temporarily recovering he left for Los Angeles, where he had a home, although he was practicing in Salt Lake City. Later advice from his attending physician showed a recurrence of his symptoms with a very low blood-pressure. He improved temporarily on giving him solution of adrenalin chloride, but he died a few weeks later.

The autopsy showed cancer of the suprarenal gland, with also carcinoma of the stomach.

Circumscribed Peritonitis with Exudation.—Pancreatic cysts usually occupy the lesser peritoneal cavity or omental bursa. In circumscribed peritonitis there are usually fever, pain, and tenderness, more acute than in a cystic growth. Leucocytosis would generally be found on examining the blood. Ascites is usually easily differentiated, although a cystic tumor filling the whole abdomen is sometimes misleading.

Cystic Disease of the Ovary.—Several cases are reported of a large pancreatic cyst having been mistaken for an ovarian cyst. About two years ago I was

consulted regarding a woman about seventy years of age, who was suffering from a large cystic tumor, filling the entire abdominal cavity. The history and physical signs pointed to its origin being in the left side of the pelvis. She refused operation, and died a few weeks later. I got permission to perform a partial autopsy, which showed a large cystic tumor filled with thick gelatinous fluid, originating from the left ovary and extending up to near the diaphragm. This tumor might have been mistaken for a cystic tumor originating in the upper abdomen or an ascites.

Hydrops of the Gall-Bladder.—Hydrops of the gall-bladder is located more to the right side, and is attached to the liver.

The material upon which investigation of pancreatic cysts has been founded, has been rather scant. In the majority of cases dealt with surgically, a cyst has been opened, stitched to the abdominal wall, and drained. This has seemed to the operators to be the most prudent and desirable thing to do to minimize the mortality. Museum specimens of pancreatic cysts are rare. There is no doubt that in some cases when all signs, physical and chemical, have been elicited, the cystic tumor has only a secondary connection with the pancreas. These have been described by Korte as pseudocysts—peripancreatic cysts.

Pancreatic cysts may be classified as follows:

1. Retention cysts.
2. Proliferation cysts { Cystic adenoma. / Cystic epithelioma.
3. Hydatid cysts.
4. Congenital cystic disease.
5. Hemorrhagic cysts.
6. Pseudocysts.

The last form is not a true pathological classification, but a convenient clinical term.

Some reports in recent literature (Hirsh & Veeder,

Uni. of Pennsylvania Med. Bull., May, 1910) report a true cyst of the pancreas. At the operation the cyst was found in the lesser peritoneal cavity, and was free from adhesions, being attached by a pedicle to the head of the pancreas. After removal, the wall of the cyst was found to contain pancreatic tissue, and its contents showed the presence of enzymes.

Korte (Cent. Med. Work, 1911, xxxvii, 3-36) reports six cases of inflammatory pseudocysts treated by marsupialization. Symptoms simulating gall-stone colic were elicited in these cases.

Dobson and Telling (Brit. Jour. Child. Dis., 1909, vi, 202) have published a description of a pancreatic cyst, lined with cylindric epithelium, in a child of eleven.

Conolly (Lancet, 1911, i, 803) found a large pancreatic cyst in an infant fourteen months of age.

In one case of pancreatic cyst, reported by Albert and Page, the cyst emerged to the right through the foramen of Winslow into the greater peritoneal cavity.

Johnson relates a case where the cyst appeared in the left flank, simulating a hydronephrosis.

Vellar, in his work on the pancreas, gave records of thirteen cases operated on by evacuation and drainage in two stages. All the patients recovered, but one died later of diabetes; and in some a fistula persisted for several months.

The opening and draining of the cyst had been done in 125 cases with 7 deaths. Several patients died later from diabetes. Total extirpation had been performed in 26 cases, with two deaths.

Besides these, six cases of hydatid cyst of the pancreas have been operated on with no fatalities.

Pancreatic cysts are about equally frequent in men and women. The greater number of cases are said to occur between the ages of twenty and forty years.

Occasionally, cysts are associated with pancreatic calculi.

Lazarus cites 41 cases with a history of trauma.

Causes.—Opie says, "The presence in cystic contents of one or more enzymes resembling those of the pancreas, was formerly believed to give proof that a cyst had its origin in the pancreas. Frequently all of these enzymes are absent in the contents of a pancreatic cyst; whereas fat-splitting, diastatic, or protolytic enzymes are found in fluids not derived from the pancreas.

Symptoms.—The symptoms depend somewhat on the size and location of the cyst. Stomach symptoms are frequent. A rounded, slightly fluctuating tumor in the epigastric region in close relation to the stomach, is suggestive. The tumor varies in size, often being the size of a child's head; sometimes it may fill the entire abdomen. There are usually weakness and loss of weight. Diabetes is occasionally present, as in the Case 1, reported below. It showed 2 per cent of glycosuria.

According to Korte, cysts of the pancreas may occupy a variety of situations, depending upon the relation of different parts of the gland to surrounding organs.

Variety of Situations of Pancreatic Cysts.—

1. In most instances the cyst growing forward presents upon the abdominal wall between the stomach and the colon, being covered by the gastric colic omentum, which must be divided at operation. Pseudocysts are said to occupy this situation.

2. A cyst arising from the upper border of the pancreas may push its way between the lesser curvature of the stomach, which is pushed downward, and the liver, being covered by the gastrohepatic omentum.

3. The cyst, especially when it is situated in the tail of the pancreas, may grow into the mesocolon,

separating its layers. If the cysts distend the upper layer of the membrane, the colon is pushed downward, and the tumor during life is found between the stomach and the colon; if the lower layer is distended, the transverse colon may be found along its upper border.

Prognosis After Operation. — Johnson watched seven cases, all with post-operative fistulas. All healed, some running as long as three years. One of the patients under my observation during the last year was operated on about fourteen years ago in Los Angeles. Drain from the fistula still continued.

SUMMARY

Pancreatic and pseudopancreatic cysts, while not rare, are of sufficient importance to be recorded.

The *x*-ray is an important aid in diagnosis in showing the position of the cyst in relation to the stomach and other organs.

The treatment is surgical, usually incision and drainage. Sometimes it is practical to remove the entire cyst in favorable cases.

Diabetes is an occasional complication of pancreatic cysts, and when present renders the operation more dangerous, although one should not hesitate when less than 4 per cent of sugar is present (Charles H. Mayo), after giving a diabetic diet and a course of alkaline treatment, to minimize the acidosis, to give even these the benefits of operations.

An antidiabetic diet is advisable following operations on the pancreas, especially where the discharge is irritating. Paraffin ointments are serviceable to allay the irritation.

Explanation of drawings illustrating the normal peritoneum, the position of the pancreas, the various positions in which pancreatic cysts are found, and the methods of operating.

CASE-HISTORIES

Case 1.—Mrs. F., aged 55, Irish parentage, native of America, widow for seven years; occupation, housework; mother of three children; father died at 98 years of age, mother died at 80; two aunts died of cancers, one having cancer of the breast and one having carcinoma of the neck. She had six brothers and seven sisters. Four brothers and two sisters died young; one sister died of pneumonia.

Personal history: About ten years ago she had rather severe trauma as she fell down two flights of stairs. She states that some swelling in the epigastric region developed after the fall. The patient was first seen in August, 1916, when a tumor in the right epigastric region was found. She then went on for six months before consenting to operation. By this time some pressure symptoms had developed; and she complained of gastric fermentation and indigestion when her temperature and pulse were about normal. She complained of some weakness at times. A skiagraph was taken by Dr. C. W. Stewart, which showed the tumor lying to the right of the stomach in the upper right side of epigastric region. Examination of the urine showed 2 per cent glycosuria. The patient was admitted to the hospital on January 24, 1917, and operated on on January 26, 1917. An incision about five inches long was made over the most prominent part of the tumor, and the cyst was exposed. The walls were sutured to the parietal peritoneum. The contents were then evacuated, and amounted to about one gallon of a dark-red fluid. A drainage tube was inserted, and the wound closed. The patient stood the operation well. Dr. J. Galigan examined the fluid contents of the sack, but found no pancreatic enzymes. The patient made a satisfactory temporary recovery, and left the hospital on February 5, 1917, the wound still discharging some. The sugar in the urine disappeared temporarily under strict diabetic treatment while in the hospital. On one occasion, after being at home for about two weeks, her daughter reported that some hair discharged from the wound. About two months later the discharge was quite copious, and, believing that I could freely expose the cyst without danger, I decided to re-operate and drain in the right flank. Accordingly she was readmitted to the hospital. This time the cyst wall was freely exposed, the bowels being first carefully packed off. As much of the cyst as was possible was resected; and the large drainage-tube was inserted, coming out in the right side underneath the liver. This operation caused a marked

improvement in her condition, though there is still a slight discharge from the fistula. The patient is now able to walk several miles, and is comfortable.

The pathological report showed the cyst wall to be of the nature of a teratoma.

Case 2.—March, 1917, Mr. E. P., aged 34, an American, married, has two children; occupation, weigh-master in the Garfield Smelter; his father living and in fair health; father has had operation for what is known as gall-stones, but none were found; the mother died of some liver trouble; one sister and one brother are living and well.

Personal history: His health was good until about 1903, at which time he was taken with colicky pain, and had considerable vomiting. He was then living in Los Angeles. Dr. George Lasher, of that city, operated on him, and found what was diagnosed as a pancreatic cyst. The cyst was sutured to the abdominal wall, and drained. Drainage has persisted ever since, but does not prevent the patient from working, though it causes him considerable inconvenience, as about half a pound of fluid is discharged daily from the fistula.

A sample of this fluid was sent to the Utah Wassermann Laboratory for analysis. The sample submitted for examination presented the following, according to Dr. A. Blumberg:

Odor, unpleasant.

Color, dull gray.

Sp. Gr., 1.015.

Reaction, alkaline.

Albumins, 0.2 per cent.

Fehling solution, not reduced.

Alkalinity, 28 per cent expressed by c.c. of the tenth normal HCl utilized.

Alkalinity, due to carbonates.

Enzymes present as follows:

Proteolitic.

Lypolitic.

Rennet, distinctly present.

Amylolytic, in traces.

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REST AND OPEN OPERATION IN JOINT-INJURIES

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While this paper has to do mainly with joint-injuries, the theory promulgated applies equally well to any other conditions involving joints.

By rest is meant no passive or any other kind of motion for at least six weeks following injury, or, rather, following operation which necessitated opening the joint to correct deformity.

During the past ten years I have collected some thirty cases that have required opening the joint for correction of the deformity, and it is a report of these thirty cases that I wish to submit at this time. Twenty of these cases were elbow joints. The list includes wrist, elbow, shoulder, ankle, and knee joints. It includes cases where the joint has been opened for other conditions than fractures. In this list of cases no motion of any description was permitted for six weeks, whether the patient was a child or an adult.

The joints were made as immovable as rigid splints would make them, but in only one case was plaster of Paris used.

It is my honest opinion that early passive motion tends to produce added irritation in an already sensitive joint, and will result in an ankylosis, especially if persisted in at too early a period or before the rent in the capsule is repaired. Give the joint a

rest, and nature will take care of the disease if you have gotten the bones coapted, and the joint freed of foreign substance. It is my opinion, further, that it requires six weeks for nature to repair a rent in the capsule of a joint; and, if you begin early pulling and hauling on this capsule, you are going to invite trouble, and it will be six years or never before you repair said joint. If the joint-fluid escapes—and it did in all these cases—do not start operating the machinery before it is properly oiled, for nature will again come to the rescue if you give it a little time to manufacture the required amount of "oleaginous osculessency."

The joint, if left alone, will reproduce the same amount of joint-fluid or, at any rate, enough to operate the joint in six weeks.

We all know what happens to an automobile or other kind of machinery if one allows any kind of an aperture to permit all the oil to escape: it will not work. It will work again if you plug up the hole, and put in more oil. If we were absolutely sure we had the capsule air- and water-tight, I believe we could inject a good quality of oil in the capsule, plug up the opening, and start operating on the joint at once; but this is rather hard to accomplish as they do in fixing machinery; but we have another way, and that is the one we are interested in today.

Some may say that six weeks' rest is too long, or is longer than is necessary. That may be so, but there has been no trouble when joints have been left for six weeks or even longer, and it seems that repair will be a little better if the rest is continued for six weeks, rather than if it is discontinued at any time sooner than that.

CASES

Case 1.—One of the most interesting cases in the list, and one that demonstrates what nature will do for us some times, if we give it half a chance, was that of a boy nine years old.

He had a necrosis of the knee-joint with several sinuses. He struck his left knee when about two years old, and had had trouble, off and on, ever since. He had a radiograph taken of knee in 1912, which showed necrosis, but nothing was done. He fell some time about January 1, 1913, and an *x*-ray ten days later showed a fracture about four inches above the knee-joint. On January 4, 1913, he was operated on with the idea of cleaning out the knee-joint. When the joint was opened up wide, the lower end of femur fell out, and the bone was so diseased we did not try to return it. About one-half to one inch of the upper ends of the tibia and fibula were sawed off, and the cavity of the knee-joint was completely scooped out, drained, and mobilized by means of a galvanized iron splint, in front and back, strengthened by riveting on each splint a piece of angle-iron, the angle-iron looping up over the knee-joint above, and straight across below, separating the upper and the lower parts of splints from four to five inches, thus providing plenty of room for dressing the wound. No attempt was made to prevent shortening, because we rather wished for some shortening on account of expecting a stiff knee. The leg was not moved for six weeks, when the patient was permitted to stand on it. He had a complete recovery with about three inches' shortening, and, best of all, some motion. He plays football, and all other kinds of ball, and even runs bases, which goes to show that nature sometimes makes us a new joint if we give it half a chance.

Case 2.—The next most interesting case is a wrist-joint. This patient while working in a field had his right wrist run over by a disk, severing all the extensor tendons and fracturing the ulna and the radius. The hand was very badly lacerated, and it was feared that amputation would be necessary. The severed tendons were united, the fractured pieces of bones placed in position as well as could be, and the wound drained and sutured. The arm was fixed with anterior and posterior splints. The wrist was put at rest for eight weeks. At operation at this time the lower two-thirds of the articulating outer side of the radius had to be removed, together with other detached pieces of bone, the wound again cleaned out and drained and put at rest for another six weeks, after this the wound healed with almost complete return of function.

Case 3.—J. H. W., aged 29, on June 12, 1914, slipped, and his left knee became locked at a right angle. The *x*-ray showed four loose bodies in the joint, one about half the size

of a large walnut becoming wedged in such a manner that it could not be displaced.

Under ether on June 16, 1914, the joint was opened by two incisions, one on either side of patella. The pieces were removed, the capsule was sutured, and also the fascia and skin with catgut sutures. The knee was fixed by a straight posterior splint for six weeks, with complete return of function.

Case 4.—G. W., aged 14, fractured the internal condyle of the humerus, and was operated on on March 1, 1908. The joint was opened, the bone wired in place by silver wire, and retained in place by a right-angled splint for six weeks without deformity.

Case 5.—W. T., aged 7, fractured both condyles of the humerus, and was operated on on August 14, 1909, at the Rock Island Hospital. A rather heavy wire was used, and had to be removed eight weeks after being introduced. The arm was put up in a right-angled splint for six weeks, with perfect restoration after the removal of the wire.

Case 6.—F. S., aged 17, had a bullet wound in the elbow, shattering the ulna. The joint was opened on November 20, 1910. The bullet and pieces of the bone were removed. The wound was closed in the usual manner with a tube-drain fixed by a right-angled splint for six weeks with perfect elbow.

Case 7.—E. S., aged 6, sustained a fracture of the left elbow joint, which was opened on September 4, 1912. The bones were wired, the wound closed in the usual manner, and the arm was up at a right angle for six weeks. Recovery without deformity followed.

Case 8.—V. E., aged 4, sustained a fracture of the external condyle of the right humerus, the joint was opened on October 30, 1908. The fracture was adjusted and wired with silver wire, and put up at a right angle for six weeks. The joint was fully restored.

Case 9.—Mr. C. W. T., aged 46, fractured the lower end of the right fibula and also sustained a dislocation of the fibula. It could not be replaced without an open operation. The bone was wired, and the dislocation reduced at St. Anthony's Hospital on December 30, 1913. A lateral splint was applied for six weeks without deformity.

Case 10.—D. J., aged 5, had a fracture of both condyles of the right humerus, and was operated on at Rock Island Hospital on September 23, 1914. The bones were wired, and the elbow placed in a right-angled splint for six weeks, with recovery without deformity.

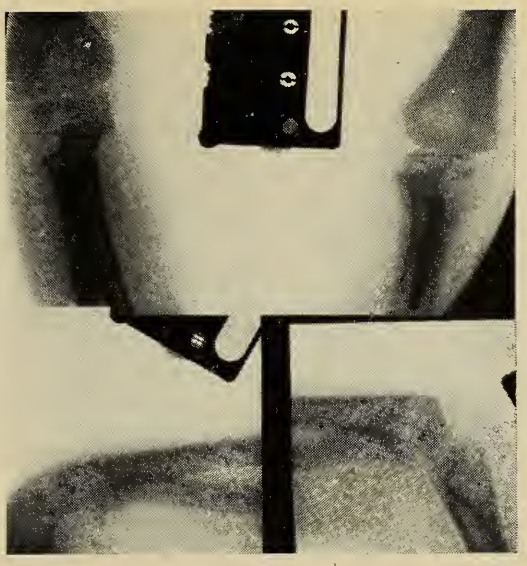


Fig. 1. Fracture of the upper end of the ulna. Both arms are shown for comparison.

Fig. 2. Loose bodies of the knee-joint.

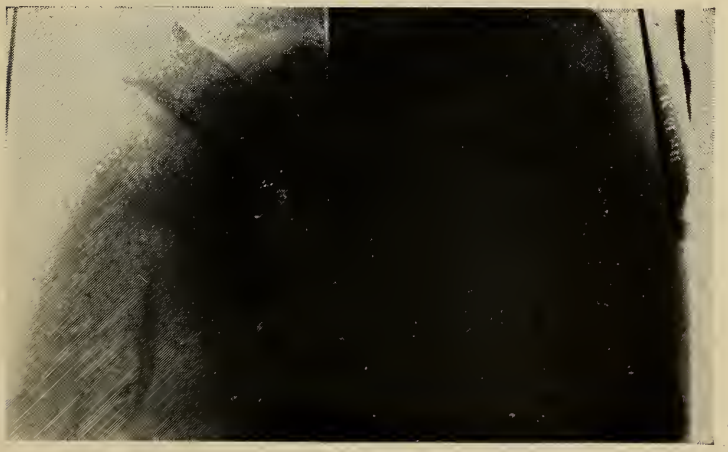


Fig. 3. Resection of the upper end of the humerus. Notice the growth of new bone. Nature is gradually making a head for the humerus.

Fig. 4. Necrosis of the knee-joint. The good knee is shown for comparison.

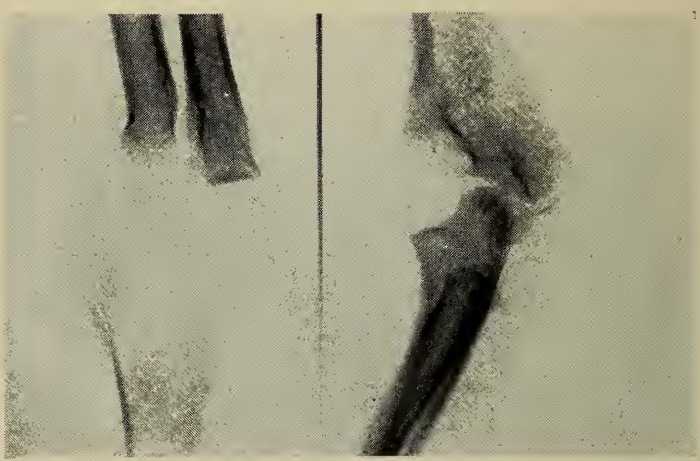


Fig. 5. Old elbow-fracture partially ankylosed, restored by open operation and rest.

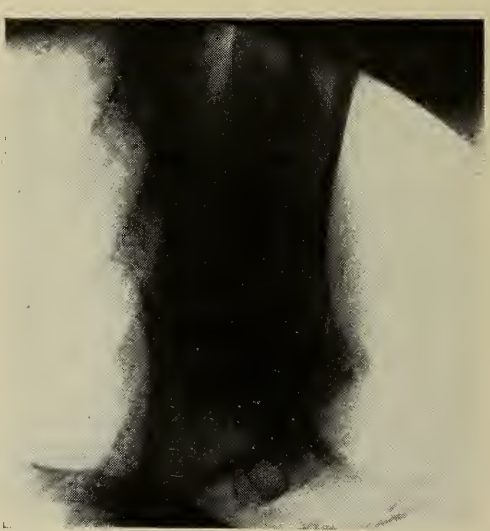


Fig. 6. Dislocation of the head of the humerus. It could not be reduced without an open operation.

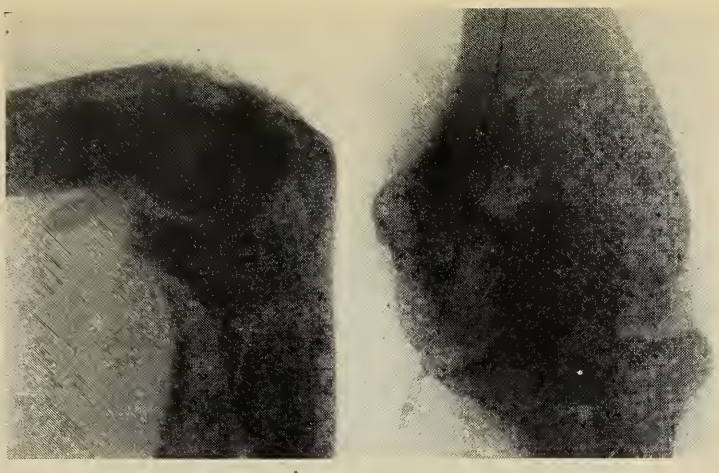


Fig. 7. A loose body in the elbow-joint.

Fig. 8. Fracture of the external condyle of the humerus.

Fig. 9. Fracture of the lower end of the humerus. Both condyles are broken off.

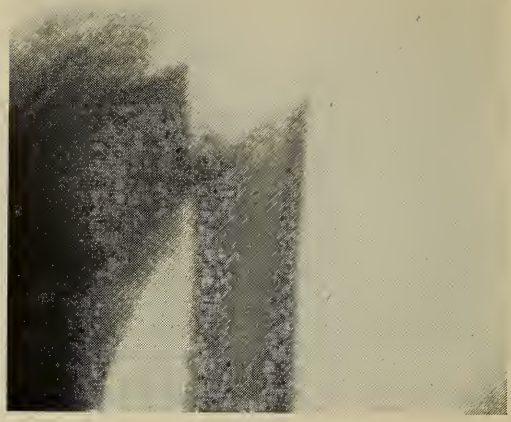


Fig. 10. Fracture and dislocation of the upper end of the humerus.

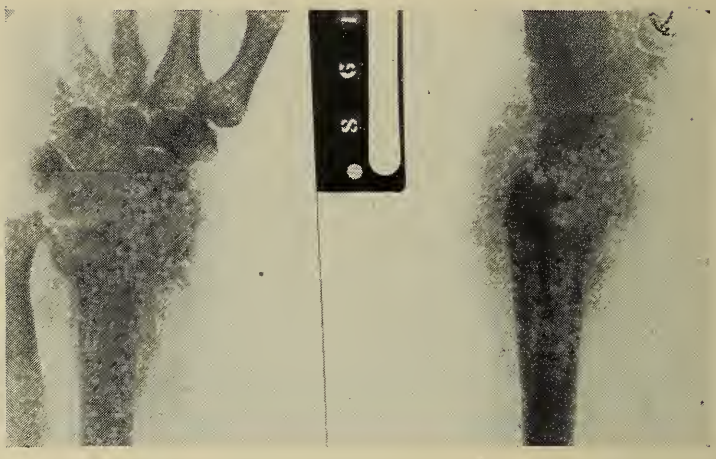


Fig. 11. Compound comminuted fracture of the lower end of the radius.

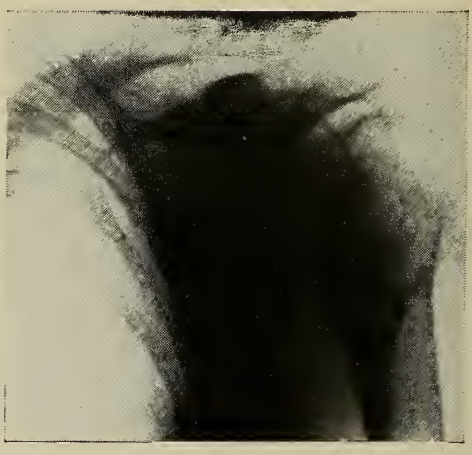


Fig. 12. Comminuted fracture of the head of the humerus in a woman seventy years old. The fracture could not be adjusted without operation. Operation performed more to relieve pain than the deformity.

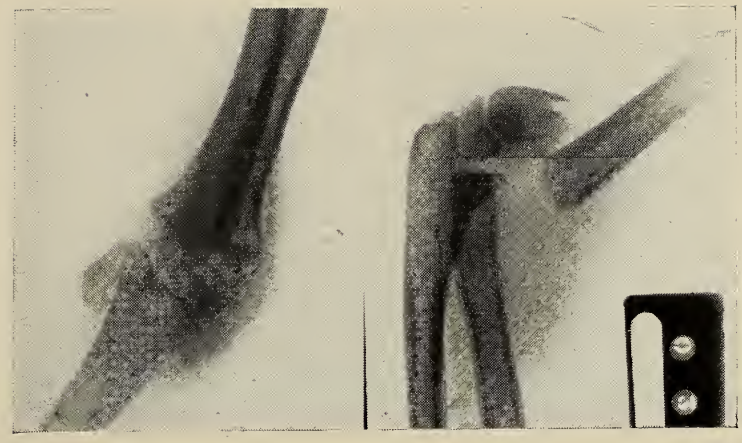


Fig 13. Lateral and anterioposterior views of the elbow, which shows that it is next to impossible to restore the joint without an open operation.

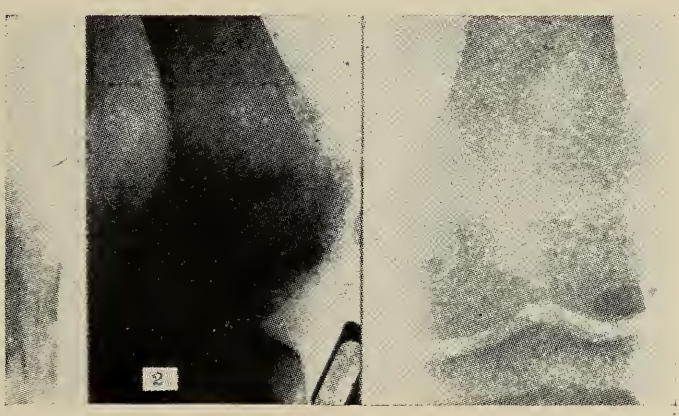


Fig. 14. This shows a bullet imbedded in the external condyle of the femur. Each view is on an eight-by-ten plate. These views tell one at once that the bullet is imbedded in the bone, and that the surgeon must be prepared to enter the bone to remove it.

CASE 11.—W. C. T. fell fracturing the tibia and the fibula near the ankle-joint. The fracture united in good position, but the patient continued having pain on account of the displacement of the tendons under both malleoli. On January 27, 1914, the tendons were replaced and the sheaths and fascia sutured over. Recovery followed with a good joint free from pain.

CASE 12.—G. G., aged 15, was accidentally shot in the right knee. The bullet lodged in the femur in such a manner that it was necessary to open the joint in order to extract it. The bullet was removed by opening the joint on June 30, 1913. A small drain was left in the bone at the site of the bullet. The joint was closed in the usual manner, and kept at rest for six weeks, with perfect recovery.

CASE 13.—F. G., after fracture of both malleoli and dislocation of the ankle-joint six weeks before, he was operated on on May 23, 1913. It was necessary to remove both malleoli, together with about four inches of fibula. The wound was sutured, with drainage. The patient made a good recovery with a movable joint after six weeks' immobilization.

CASE 14.—L. C., aged 6, sustained a comminuted fracture of the lower end of the humerus with fragments of bone left in the elbow-joint. The joint was opened, and the bones wired in place on October 29, 1914. Recovery was perfect after six weeks' rest in a right-angled splint.

CASE 15.—I. O., aged 5, sustained a fracture and dislocation of the olecranon process. The joint was opened, the dislocation reduced, and the fracture adjusted and sutured in place. The joint was put up in a right-angled splint for six weeks. The operation was done at the Moline City Hospital on June 14, 1913. Recovery was perfect.

CASE 16.—Mrs. A. C. S., aged 48. Her oleocranon was fractured and dislocated. She was operated on on January 11, 1915. The dislocation was reduced, and the fracture adjusted and held by wire, and placed in a right-angled splint for six weeks. The joint-motion was the same as before the injury.

CASE 17.—J. W., aged 23. After an injury it was four weeks before the patient was able to straighten the left knee. An *x*-ray showed pieces of bone in the knee-joint. The joint was opened, pieces of bone removed, and the joint closed without drainage, and kept at rest for six weeks. Recovery with full motion followed.

Case 18.—C. C., aged 34, had a piece of bone broken from the spine of the tibia and attached to the articulating surface of same in such a way as to completely cripple the joint. After its location by the *x*-ray, the joint was opened, the piece chiseled off, and the joint closed without drainage, and kept at rest for six weeks. The operation done on December 9, 1913. The patient had been a complete cripple for three months previous to the open operation, and has had no pain nor loss of motion since the limb was taken out of splints.

Case 19.—C. S., aged 45, fractured the upper outer articular half of the left tibia, and was operated on on August 15, 1908. The joint was opened, and the tibia wired in place by silver wire, with rest for six weeks. Recovery followed without loss of motion.

Case 20.—J. E. R., aged 40, had a loose body in the right elbow. The joint was opened on August 28, 1916. A piece was removed, and the joint put at rest for six weeks. There were no sequelæ.

Case 21.—M. C., aged 6, had a fractrue of the external condyle of the humerus. The joint was opened, and the bone wired in place on May 15, 1917. Recovery without loss of motion followed.

Case 22.—O. B., aged 45. About eight weeks ago he began having pains in the elbow, the whole region about the elbow was swollen and inflamed. The elbow was lanced at this time, and a large quantity of pus was evacuated. Following this, the elbow became stiff with the arm in an extended position. On September 2, 1913, he was *x*-rayed in my office. The only abnormality showing at that time was a dark spot, possibly a pus cavity. He returned home, and under ether, the adhesions were broken up and the elbow placed at a right angle. There was no relief from pain, and he was returned again and *x*-rayed. On October 15, 1913, the *x*-ray showed considerable necrosis. He was operated on on October 18, 1913, the necrosed bone was removed, and the wound curetted and swabbed with iodine. The wound was left open, and packed with iodoform gauze. He made a good recovery. While there were not full flexion and extension of the elbow, it was free from pain and could be flexed and extended fully two-thirds of normal. The elbow was kept at rest for six weeks after operation.

Case 23.—H. G., aged 16, sustained a fracture of the left elbow. The bones could not be retained in proper position, and the joint was opened on October 5, 1909. The bones were wired in place with laundry-belt wire. The arm was put up at a right angle for six weeks. Recovery followed without deformity.

Case 24.—W. S., aged 5, had a fracture of the external condyle of the left humerus. On August 27, 1917, he was operated on. On August 29 the bone was wired with aluminum wire, and wound was closed in the usual manner. It was held at rest at a right angle for six weeks. Recovery followed with all motions of elbow fully restored.

Case 25.—A. H., aged 10, had a fracture of both condyles of the humerus and dislocation. The fracture was compound, the elbow was opened where the bone protruded, also in two places on the opposite side. It was possible to see clear through the elbow-joint. The dislocation was reduced, and the bones adjusted and retained in place by aluminum wire. The wound was drained, put up at a right angle, and placed in a plaster cast for six weeks. The operation was done at St. Anthony's Hospital on September 9, 1910. The recovery was complete in every respect.

Case 26.—S. F., aged 12, had a fracture of the external condyle of the left humerus. The joint was opened and wired on December 14, 1914. The arm was at rest in a right-angled splint for six weeks, and recovery was perfect.

Case 27.—A. T., aged 10, had a fracture of the external condyle of the humerus. The joint was opened and wired on August 22, 1914, and was put up at a right angle for six weeks. Recovery with no loss of functions followed.

Case 28.—V. R., aged 11, had a fracture of the lower end of the left humerus, both condyles being broken off. The joint was opened, and the bones wired on September 17, 1916. The wound was closed except for a small cigarette drain, and put at rest in a right-angled splint for six weeks. Perfect recovery followed.

Case 29.—B. E., aged 15, had a fracture and dislocation of the inner condyle of the left humerus bone, which was wedged into the joint between the ulna and the humerus, and could not be dislodged except by an open operation. The joint was opened, and the bones wired in place, with a small drain in one incision. The arm was put up in a right-angled splint for six weeks. Recovery with restoration of joint followed.

Case 30.—M. D. E. W., aged 8½ years, had a fracture and dislocation of the head of the left humerus. The joint was opened, the dislocation reduced, the fracture adjusted and wired, and the joint kept at rest for six weeks. The operation done on June 26, 1917. The joint was fully restored.

CONCLUSIONS

While thirty cases do not positively prove anything, yet they have demonstrated to my own satisfaction that I can get, and have gotten, perfectly good joints without passive motion, or, in fact, any kind of motion for at least six weeks, even though the joint has been wide open, allowing all the joint fluid to escape, provided we give nature sufficient time to repair the rent in the capsule.

This length of time I believe should be at least six weeks' rest.

I believe, further, that nature begins at once to manufacture new joint-fluid if we just keep things quiet and let nature do its part.

DISCUSSION

Dr. Daniel N. Eisendrath (Chicago, Ill.): This is a very important subject because we have so many of these injuries in the war, and, sooner or later, we shall see the results of them in our reconstruction hospitals.

I do not quite agree with Dr. Sala in the points he has enunciated to postpone immobilization and active and passive motion of the joint until the end of six weeks. My own practice, especially with children, where the majority of these elbow fractures have occurred, is to begin motion as early as the second to the third week, but not very active motion. I usually put them in the position of acute flexion. After stumbling around, after having made several trials with the position of putting them up in complete extension rather than at right angles, I have come to the uniform method of putting them up, which I find is the best of all, namely, the Jones position of acute flexion. My own practice is not to apply a splint in these cases of the ordinary type, but simply mould a plaster-of-Paris splint, which is laid upon the arm in the

position of acute flexion, which plaster splint covers the posterior half of the arm. It is better than any splint you can buy, and allows for any swelling to take place, and you can remove the splint. Then, instead of leaving them, as Dr. Sala advises, until the end of six weeks, I begin motion about the second week, taking the arm out of the splint and beginning light passive motion, and keeping on with that until four or five weeks, when the union in children is solid. I have used apparently the same principle of immobilization that Dr. Sala has outlined. If the joint is painful at this period I use a jointed splint, or, better still, I allow the child to use a very excellent and homely method that anybody can apply, namely, I take an ordinary pulley and put it up at the top of a door-frame and suspend over a clothes-line a small bag of salt, using, say, half a pound or more, and increasing it from time to time, and at the other end of the rope there is a handle. I encourage the child to make use of this. These children will do more for themselves in this way than any professional masseur can make them do. A doctor will straighten the arm, and at the end of six weeks adhesions will have formed to such an extent that the child will not allow you to do much, if anything; but in this way, by making use of a pulley at the top of a door-frame, and one at the bottom, and allowing the rope to come through, it is almost like a Whiteley exerciser that we use in athletic work. For about fifty cents you can make such a gymnastic apparatus.

The same thing is true with adults. For elbow fractures I use two pulleys, one at the bottom and one at the top of the door. You can get all the extension you need.

For shoulder fractures—especially is this true of elderly people—or for dislocation-fractures or for fractures or dislocations alone, this is one of the simplest and best apparatuses for patients to use, to put on a bag of salt, and you can make flexion or extension in five or ten minutes, and with such an apparatus these patients will do for themselves more than you can do for them.

I have been keeping track of the literature with regard to early passive motion. Where you let joints go until two and three months have passed, and suddenly begin passive motion to restore the function of the joint, it is something to be looked after. Hey-Groves has published a monograph which he calls "The Modern Treatment of Fractures." In it he enunciates some of the principles of early passive motion and the treatment of the function of the joints adjacent to fractures which, in the past, we have been so apt to forget.

Dr. Sala is to be congratulated on his results. There is only one point in which I differ with him. I have found it unnecessary to enter many of these joints, especially in children, to try to reduce them. I have usually depended upon obtaining as good position as we can under anesthesia, and then trying to maintain that position without any operative intervention. No one has a better opportunity to see the evil results of treatment of fractures than those of us who are on the surgical staff of the Cook County Hospital. There is a tendency nowadays to cut down on every fracture. The indiscriminate treatment of the surgeon or physician who does a moderate amount of this work is shown by a marked deformity in the *x*-ray plate in these cases. He gets poor results. In other words, the anatomical results are not always ideal, but the functional results are, and we are apt to judge by the inaccurate position of fragments and get poor results and infection. We shall get infection if we cannot hold the bones together, and the result in our fracture work at the Cook County Hospital, which is the clearing-station for all Chicago, shows that we are apt to cut down on fractures too much and too early.

If any of you have never had a clear idea of the value of extension in fractures of the thigh, you will get it in the book I have mentioned.

This subject today is getting to be one of the livest subjects in general surgery.

Dr. Arthur T. Mann (Minneapolis, Minn.): We have a great many fractures to take care of, and I have been rather conservative about the operative treatment of fractures. I believe there is a middle ground. In the past the tendency has been not to operate enough, while the tendency today is to operate too much. I feel that we are operating on more and more of these cases, but not by any means on half of the cases; it would probably be about 16 to 20 per cent of the fairly bad cases in which we have to do an open operation in accordance with our present position.

In connection with the acute angle position at the elbow, I think all of us use it. It is the best single position there is for fractures at the elbow. It is not, however, the Jones position: it is the Smith position. Dr. Smith, of Boston, described this position in the *Boston Medical and Surgical Journal* about twenty-seven years ago. Dr. Smith, who was connected with the City Hospital in Boston, went into the

dissecting-room with the determination to find out about the various positions,—the right-angle position, the straight-arm position, and the various positions between. He reproduced fractures at the elbow, as well as he could, on the cadaver, and assumed the various positions and tried to find out how fixed the fragments were in these different positions. In almost all of these low fractures, except where they were straight across, he found to his surprise that when they were put in an acute-angle flexion, they were locked by the coronoid process in front and by the tendon of the triceps and the stretched capsule of the joint behind. That, then, is the Smith position, and the best single position we have for fractures at the elbow. It is not to be used in all cases.

A simple way of fastening the arm is by a simple adhesive strip behind the arm and around the wrist. No splint is necessary. Your slings and so on are for comfort of position. The arm is fixed, and the elbow is free. With the acute-angle flexion, the proper position, usually, is with the thumb turned towards the shoulder. That gives it the strongest lock. An exception to the use of the position is where the fragment is torn in such a manner that the periosteum and soft tissues are torn on the back, and it has a tendency to be displaced forward. Occasionally, you will find there will be a tendency to displacement which you do not correct. The periosteum and cartilage fastened in front, sometimes, and only sometimes, make the straight-arm position the correct position. Every fracture must be considered by itself, and experience is essential in the treatment of fractures. It is not the splint or the apparatus you use, it is the man behind the gun, and what he puts into it that brings about the result. A good surgeon can get a good result with a poor thing, while a poor surgeon gets a bad result with a good thing.

As to this device, spoken of by Dr. Eisendrath, for bringing up the arm: It is an excellent thing. Some years ago I devised a method which can be used in conjunction with this and which has proven to be most excellent. I will try to illustrate it on the blackboard. (Illustrating.) (See Figs. 1 and 2 on insert.)

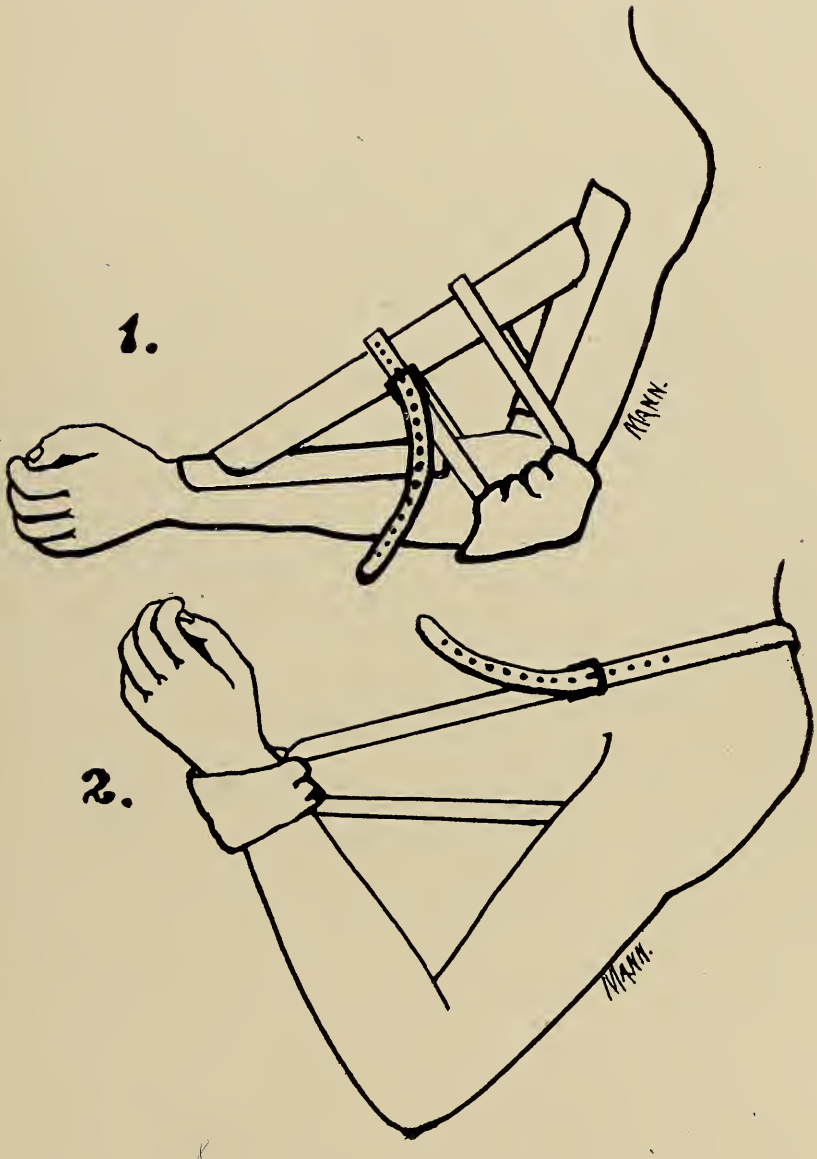
If the arm is more or less fixed at the elbow for gaining extension, I put a piece of paper upon the arm and outline two forms, one for the front of the lower arm and one for the upper arm. When these patterns are cut from a sheet of tin

and bent to conform with the curve of the surface of the arm they serve to carry the ends of a third piece of tin cut of suitable length and bent into the form of a round arch. (Fig. 1.) The minute you get it into the form of an arch it is very strong. I put a pad under the first two, and strap them with adhesive plaster onto the arm. This is done simply for fixation. We take the longest measure for the third piece because the arm will extend and be longer after awhile. That gives you a basis for a pull. Then by folding a piece of cloth and doubling it below the elbow it puckers up in the center, and you have a sling with a loop in it. A strap with a buckle is passed through the loop on one side, across over the bridge, and down on the other side. It is then passed through the loop of the cloth sling on the other side of the elbow, back again over the bridge, and buckled to the loose end. One now tightens it up, and while it is hurting some and stretching the elbow, the patient walks around, and it is working all the time. One can leave it on for a little while and then tighten it up a little, and gradually the elbow is straightened. This can be done two or three times a day, or it can be left on all day and be tightened a very little from time to time or it can be loosened at times for a rest and tightened again after a while.

The converse of that is the means of flexion, and that is very simple also. (Fig. 2.) One gets the arm up as far as it will go, and then puts a litle sling around the wrist. That can be put straight around. Then with a strap run through this, back under the arm, around over the shoulder, and buckled to the loose end near the wrist, one has the purchase for a pull. One buckles it up, and the patient walks around while the elbow loosens up a little and one tightens it up a little more. One can accomplish more with this than with pulleys although the pulley is an excellent thing.

Dr. C. H. Lemon (Milwaukee, Wis.): Dr. Smith, of Harvard, may have been the first man to advocate acute flexion of the elbow in the treatment of fractures around the elbow-joint, but certainly to Jones, of Liverpool, belongs the credit of having showed us the rationale of this procedure, as well as for popularizing the treatment, which is the most important consideration.

Dr. Mann has had a very large experience in the treatment of fractures, and he is certainly very ingenious in the use of splints; but there is one thing I would like to call attention to, and that is, in the treatment of fractures of the elbow-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joint, particularly a supracondylar fracture, if you put the thumb in the position he indicated, or as Ashhurst, of Philadelphia, shows it in his monograph on the subject, under the chin, you certainly will get a deformity, because the rotation of the lower fragment of the humerus is not accompanied by rotation of the upper part of the shaft of the humerus. That ought to be perfectly obvious. Jones has called attention to the necessity in all these fractures of the elbow-joint of putting the hand upon the shoulder so that the plane of the bones of the forearm shall be in the same plane as that of the humerus.

Now, in the elbow-joint we have a hinge-joint, and, if we have a broken hinge on a door and we close the door, the constituent parts of that hinge go in place and are exactly in place. In fractures of the condyle of the humerus, if the condyle is broken from the humerus, it is attached by its ligamentous structures to the other bone, and by simply closing up the hinge, so that it is securely closed, these various portions of the bones that are fractured will fall accurately into place. You will not need any splints, as Dr. Eisendrath has said; and in my own experience you do not need any more than a molded splint. In my own practice I use a figure-of-8 bandage so that the child or the adult can move the arm in different directions; the hand is maintained over the shoulder, so that we have these two bones in the same plane.

Dr. D. S. Fairchild (Clinton, Iowa): It hardly seems to me to be the best practice to adopt any standard way of treating these elbow fractures, but we should be governed by the result when the fracture has been reduced as to the position. We can ascertain the position the bones are in after the fracture has been reduced, and the position that will give the most perfect reduction is the one which seems to be the best to be observed.

In cases of fracture in children, it seems to me, if the arm is flexed at an acute angle, we shall get the best final results, because children will in their play very soon straighten the arm down, but they are slow in bringing it up. It seems to me that, in the reduction of fractures, we should be governed by the position in bringing about the best results after the fracture is reduced. By *x*-ray examination of the reduced fracture we are able to determine accurately whether the right-angle position is the best, or whether the flexed position is the best; and, of course, our idea is to bring the bones into

most perfect apposition possible, getting as nearly correct anatomical results as possible, but all things taken together, it seems to me, acute flexion is really the desirable position in which to dress the arm, especially in the case of children for the reason which I have mentioned.

Dr. R. E. Farr (Minneapolis, Minn.): I had not intended to participate in this discussion, but, being invited to do so, I want to mention a little apparatus I saw demonstrated by one of Dr. Crile's assistants. The arm was duplicated by three pieces of board held together by a hinge thus simulating the elbow-joint. The various fractures about the elbow-joint were reproduced by dividing the boards at corresponding points. Acute flexion of this apparatus would effectually lock any fracture. I was speaking to Dr. Eisendrath about this apparatus, and he asked me to mention it to you.

The point brought out by Dr. Sherman, of San Francisco, is very important in relation to fractures near the joints. The limb should be held while under treatment in the position which is most difficult for it to assume during convalescence. The abduction of Whitman in the hip, acute flexion in the elbow, and abduction in fractures of the shoulder-joint are examples.

Dr. Sala (closing): I am very much obliged for this free discussion. I asked Dr. Eisendrath to open it because I read a paper before our county medical society a month or two ago on the same subject, and while we were eating the doctor told me he was glad I was going to read this paper, and stated at that time he was moving joints earlier all the time than he used to do, and that is the reason I wanted him to discuss it.

I said to Dr. Eisendrath, You are on the wrong track as far as early motion is concerned, because I do not touch them for six weeks. The whole point is the rent in the capsule, in a joint injury. That rent in the capsule must be repaired. Most of these thirty cases are interesting, and they have extended over a period of ten years, so the number is not very large.

We do not operate on these cases of fracture unless we think it is absolutely necessary. One of the cases I showed on the screen was not operated on. If you have a hole or rent in the capsule it will take time for nature to repair that, just as it takes time to repair fascia any place. It is possible that a great many of these joints could be moved sooner than six weeks. I am not saying that six weeks is the right time to let them stay. But these cases have been left for six weeks

before motion has been undertaken, and they have not been stiff. These patients have good joints, and that is an important thing. After six weeks the splints are removed. In children I usually advise the mother when six weeks are up to take off the bandage and splint at night. When the child wakes he already has some motion. I find they can carry most anything, such as a coal-scuttle, etc., and they soon begin using the joint as if it were not broken. In a week there will often be perfect motion, even in very young children. Possibly in some cases it will be a little longer than a week, but they will move it themselves, and it does not usually take very long. It was the fact of having these crippled elbows and elbow-joints staring me in the face that got me to figuring out, if possible, the best way to treat these cases. If you do not develop good motion, then people will tell others that Dr. So-and-so fixed them up. I had evidence of this in my office not long ago. The man was a banker, who never forgets to tell who fixed up his elbow so beautifully four years ago.

One of the most interesting cases in my series was the man who was thrown off of a motorcycle, and had a piece of the bone broken off the tibia, and for three months was a cripple. Two doctors treated him. They had taken an *x*-ray. The man had never seen the *x*-ray picture, but they said he had a fracture of the femur. He was an absolute cripple, and had some insurance, and the insurance company said that they would pay the insurance as soon as they saw the *x*-ray picture of his fracture. After being a cripple for three months and going around on crutches, I took an *x*-ray and found a piece of bone broken off from the articulating surfaces of the tibia, stuck into the knee-joint like a monkey-wrench into a piece of machinery. We chiseled off this piece of bone by an open operation on the knee joint, and while it is now some six years since the operation was done, he has not limped since, and in ten days after an *x*-ray was taken he had his insurance paid. The *x*-ray is very important in these cases.

When I read a paper three months ago before our county medical society one of the doctors took exception to dressing these cases in a right-angle position. I dressed them in that position always because I expect some of them to be crippled, and, if they were, that is why we wanted it in that position. He was quoting some one who dressed them in an extended position, and in less than a week he brought me a case I repaired by an open operation, and the boy's arm is perfectly

normal, although this doctor took exception to my way of treating it at the time.

I was in New York City a few years ago and spent an afternoon in St. Mark's Hospital. Several cases of ankylosis of the wrist were brought in, and one or two of these cases the doctor fixed up that afternoon. By forcibly breaking up the adhesions, they went away in great agony and were told to come back in a week, and the patients came back and he had to do the work over again each week. May be that is good practice, but I do not believe it. You are creating the very damage you are trying to get rid of.

Another case illustrated here was a fracture of the knee-joint, where the external articulating surface of the tibia was broken off in a triangular fracture, and we had to do an open operation, and wire. I opened the joint, and wired the tibia back into place. I had to leave the city shortly afterwards for a month's time, and I turned the patient over to another physician. I put on an ambulatory splint. I think the ambulatory splint is a good one for a lot of these fractures if you want them to be absolutely immovable. I said to the doctor, If you keep the thing still for six weeks, I will take the responsibility. I had not reached Washington before the doctor called up the man's employer, and asked him if he would not use his influence to have him use ether with a view to breaking up the joint. The man heard our original conversation, and told the doctor to stay away until I came back. As a result, the man has a good knee-joint today. I put elbow fractures in a right-angle position in most cases.

A NEW OPERATION FOR PROLAPSE OF THE UTERUS

CLIFFORD U. COLLINS, M.D., F.A.C.S.

PEORIA, ILLINOIS

The operation that I present is designed for cases of complete prolapse where the uterine ligaments have lost their elasticity, as evidenced by the uterus remaining permanently outside of the body and not receding when the patient is lying down. Kocher's operation, or Murphy's modification, is usually done in this class of cases.

If there is a cystocele so pronounced that it is not reduced when the uterus and cervix are pushed back high up in the pelvis, my operation had better be preceded by an anterior colporrhaphy, that restores the anterior pelvic floor.

The patients who have indication for this operation, are usually patients well along in years, who have had the accompanying derangement of bladder function for a long time. For these reasons they are handicapped patients, and are not good surgical risks. They should be under observation for some time previous to the operation, so that they may be put in as good condition as possible. As the patient has not been able, probably, to completely empty the bladder for a long time there has necessarily been back presure on the kidneys. After the operation the patient will be able to drain the bladder at each urination, and the back pressure will be suddenly relieved. In order to know

how the patient's kidneys will stand the sudden relief of this back pressure, it is wise to hold the uterus high up in the pelvis with a gauze tampon, and to place a Pezzer catheter permanently in the bladder, for some days preceding the operation. If the patient fails to stand well the continued drainage with relief of the back pressure, the tampon and catheter may be removed, and the patient kept under observation and treatment awhile longer, when the test can again be made.

This test is similar to that suggested by Judd in cases of hypertrophy of the prostate gland. In failure to empty the bladder these prolapse cases are analogous to prostate-gland cases.

Care should be taken that all preliminary details for the operation are completed before beginning to administer the anesthetic, so that there will be no delay during the operation, which should be completed as rapidly as possible.

A transverse Pfannenstiel incision is made over the pelvis. After the transverse incision is made through the aponeurosis, or anterior wall of the sheath of the recti muscles, another transverse incision is made about two and one-half inches long, paralleling the first incision and one-fourth inch above it. The strip of aponeurosis thus formed has its natural attachment at each end, and is composed of tissue that does not stretch. The recti muscles are separated, and the peritoneum incised longitudinally.

A supravaginal hysterectomy is done, removing a V-shaped piece out of the cervix, thus leaving an anterior and posterior flap on the cervix. The broad ligaments can usually be ligated en masse, because these patients are generally elderly and there is more or less atrophy of the pelvic structures. While the two cervical flaps are held forward the stumps of the broad ligaments are sutured to the posterior surface of the cervix and to each other.

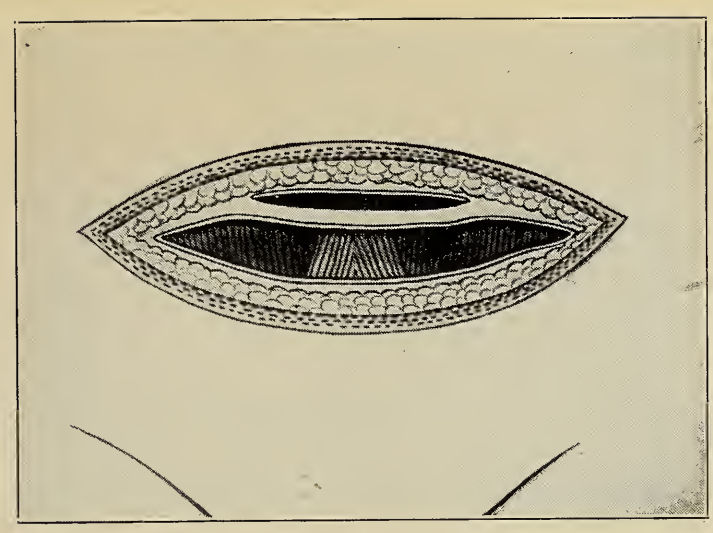


Fig. 1. The strip of aponeurosis is made by the parallel incision just below the first incision.

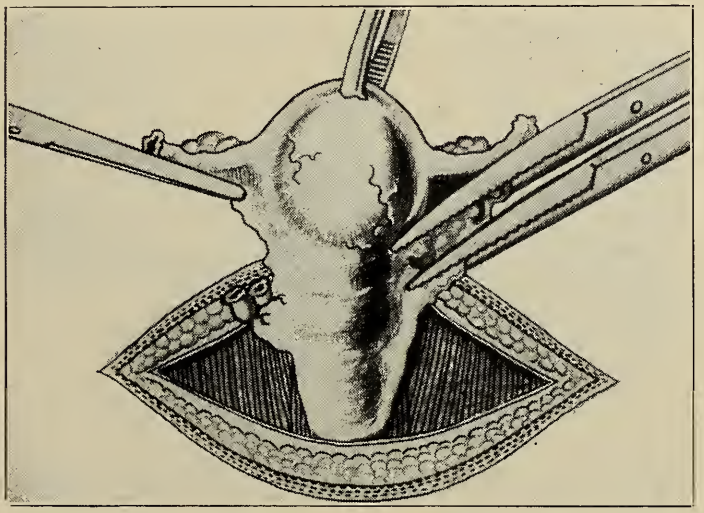


Fig. 2. In doing the supravaginal hysterectomy the structures are usually atrophied, and the broad ligaments can usually be ligated en masse.

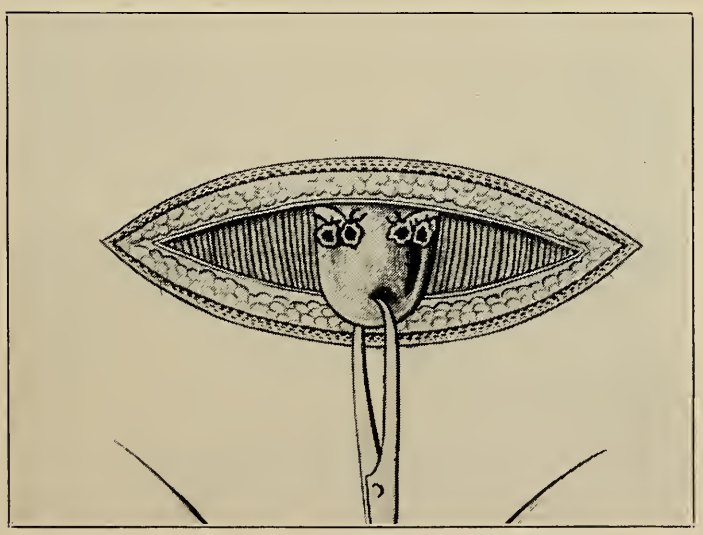


Fig. 3. The cervix is held forward while the broad ligament stumps are sutured to the posterior surface and to each other.

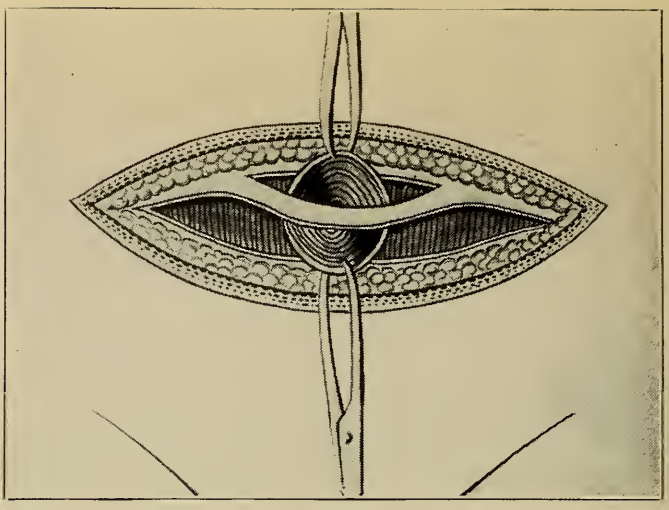


Fig. 4. The cervical flaps are held apart, and the strip of aponeurosis is laid in the trough thus formed.

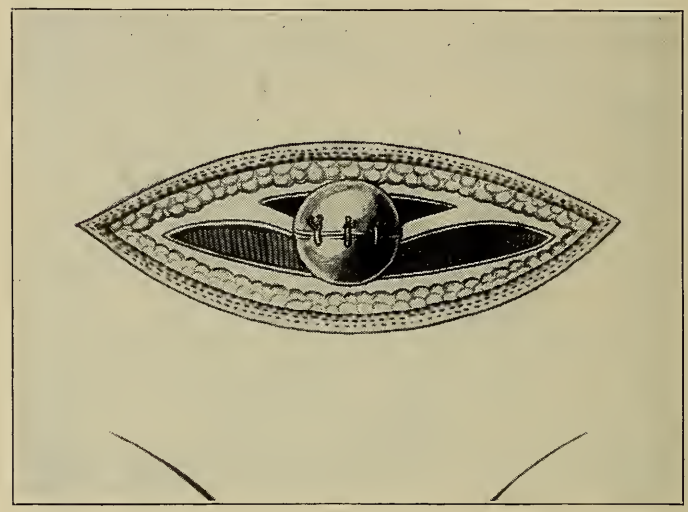


Fig. 5. The cervical flaps are sutured together over the strip of aponeurosis.

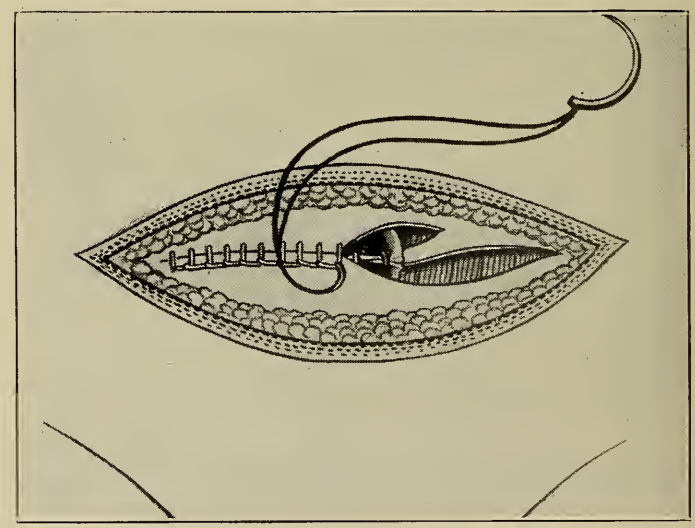


Fig. 6. The edges of the aponeurosis are sutured over the cervical stump and the supporting strip.

The cervical flaps are then held apart, and the strip of aponeurosis is dropped in the cervical trough thus formed. The flaps are then sutured together over the strip. The edges of the peritoneum and the recti muscles are sutured together around the cervix. The edges of the aponeurosis are sutured over the cervix, leaving the strip dipping down into the cervix. With the suturing of the fatty layer and skin the operation is completed.

The cervix is thus held securely in the abdominal wall by a strip of aponeurosis that will not stretch and cannot come loose from its attachments, because they are natural and have not been separated. The cervical tissue is usually hard and dense, and it is not likely to give way when the two cervical flaps have united firmly over the strips.

It seems to me that this operation is superior to Kocher's, in that no comparatively large pieces of uterine tissue are left in the abdominal wall between the aponeurotic and the muscular layers. The suspending power of Kocher's operation depends on the union of dissimilar structures,—uterine tissue with muscle and aponeurosis; while the strength of this operation depends on a normally attached strip of aponeurosis, and the union of similar dense structures (the anterior and posterior cervical flaps) over this strip.

In doing this operation I have found that the cervical canal is frequently a source of infection unless steps are taken to prevent it. I have tried tincture of iodine, carbolic acid followed by alcohol, and the Percy cautery in the cervical canal. The carbolic acid and alcohol seems to give the best results.

DISCUSSION

Dr. George N. Kreider (Springfield, Ill.): I had the pleas-

ure of hearing Dr. Collins describe this operation and of seeing the slides of it two or three weeks ago. I was very much impressed then with its ingenuity, and I am sure it will appeal to us all in connection with this operation which is capable of doing so much good to patients. I think there is nothing to be said, particularly in the discussion of the operation. I called attention at that time, and now repeat, to the necessity of taking a full history in all such surgical cases, and of taking care of all collateral affections.

The doctor spoke of the dangers of damming back urine into the kidney. A case came to my attention in which I did an operation for this trouble which had existed for thirty years. Ten years before the time I saw her she had been treated by a physician from Kansas City, who gave her large doses of bromide of potash for epilepsy. We got a history of syphilis, and before she left the hospital we treated her, not only for the prolapse, but for the epilepsy, and effected a cure of both conditions.

Before taking my seat, I would like to mention the value of the Menge pessary, which is not known as extensively as it ought to be. Many of these cases are elderly women, and the Menge pessary will cure them without a surgical operation.

Dr. B. Merrill Ricketts (Cincinnati, Ohio): I saw Dr. Collins do this operation at Effingham, Illinois, a year ago last November, and I was much impressed with the technic. I saw all of the details of the operation at that time. On my return home, in about ten days, I did a similar operation on a patient, fifty-two years of age, who had lost three children up to the age of thirty-two. She weighed about one hundred and thirty-five pounds. There was complete procidentia. I followed the technic suggested by Dr. Collins, with most gratifying results with the exception of a slight infection. It was a sort of serous discharge with pus, but slight in amount. She finally made a good recovery.

Several weeks thereafter, during the winter, when she was on a street-car holding to a strap, the car gave a sudden lurch, and threw her across the aisle. She fell over a satchel upon the abdomen. I had seen her four days before that, at which time she had no hernia, but on the fifth day after the accident I discovered a hernia, and I saw her again on last Tuesday, and she had a hernia about the size of a hen's egg.

One of the dangers of this operation is infection, and I am sure if Dr. Collins will report the cases of infection we shall find that he has had some.

I suggested to him that we ream out the mucosa of the cervical canal with a sharp trephine or knife, close it up, and let it drain into the vagina. In this way we will probably overcome infection. The woman is in a most excellent condition; the cervix is high up and she is relieved of all pain. The operation seems to me to be a most logical procedure.

Having seen so many disasters from the various methods of anchoring the uterus, I want to say to you that I have never shortened the round ligaments; I have never done an Alexander operation or any operation to hold the uterus up within the peritoneal cavity.

To give you some idea of one of my experiences, I will say that a very capable man, who spent a year abroad in studying surgery, but did not have the confidence in himself that he should have had, asked me to go one hundred and fifty miles away, and do three or four operations for him or to assist him. I went with him, and he had three cases in which he wanted the round ligaments shortened. I thought he found pathology enough to open the abdomen. Pus tubes were found in one or more of the three cases. I have acted upon the basis that stretching the tissues (whatever they may be) that are utilized for holding the uterus up, is a serious matter. I recall one case operated on by a colleague in which there were two adhesions. The gut slipped around, became strangulated, and he lost the patient. In another case in which an Alexander operation was done, the fundus attached, there were two adhesions formed, the intestine slipped through, and the operator lost this patient. I cannot see how, unless we resort to something of this kind, we can do very much good by any of these operations—that our patients may be assured of continued relief.

Dr. A. E. Benjamin (Minneapolis, Minnesota): This is a subject in which a great many old women are interested if we are not, and when these women consult you you are bound to do something for them, and any one who can devise an operation which will make these women comfortable, and which will be a success, will add something to surgical procedure.

I think Dr. Collins is to be congratulated for the operation he has devised. I, however, have gone on the assumption in these cases that the uterus is of very little use, excepting perhaps as a suspensory ligament, to hold the other tissues in position, for example, the bladder. I have modified Murphy's operation and Kocher's, and have been doing in the last four years an operation in which I remove the whole body of the

uterus, except its lateral portion, including the removal of the tubes (Fig. 1), and removing the mucosa from above and below, doing the Schröder operation below, and removing the mucous membrane of the cervical canal from above, either by dissection or by cautery; and making these flaps, which I can better illustrate by a drawing on the blackboard. (Illustrating on the blackboard.)

Take the uterus in this manner, and after dissecting out the disease of the cervix in this way from below, then we take the tubes and cut the uterus down in this manner (Fig. 2); we have the two flaps sewed up in this way, over the aponeurosis to the side of the incision (Fig. 3). This absolutely suspends the bladder, pulls it up in place, and we have no difficulty with the bladder thereafter. Furthermore, we get no infection. There is perfect drainage because we use small rubber drainage-tubes in these wounds. I suture the flaps (indicating) laterally by continuous suture around the edge, and, if there is any bleeding from the uterine artery or branches, we put in catgut through here. I usually stitch up the cervical canal so that we have no canal from which we can get infection from below. I have tried every other operation except that of Dr. Collins, and these patients are satisfied and comfortable, therefore, I have been satisfied with the work I have done for them. (Figs. 1 to 3 appear on inserts.)

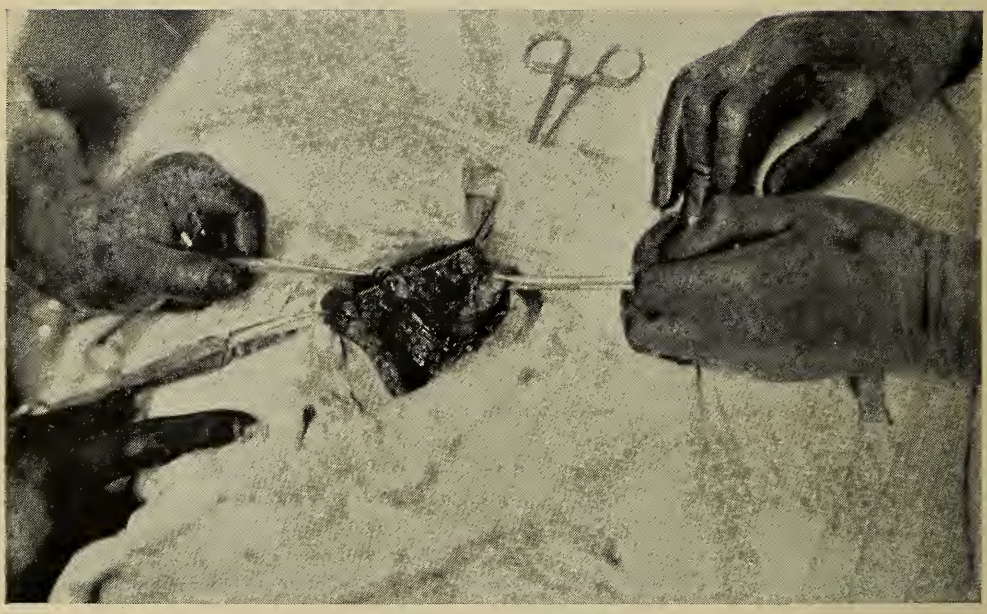
Dr. Henry T. Byford (Chicago, Ill.): I have no doubt that Dr. Collins' operation is the best of this class. To imbed a large amount of uterine tissue in the abdominal wall can be of no more use any more than to firmly fix a small stump, and it has evident disadvantages.

In prolapse there are other facts to be considered besides the descent of the uterus and bladder. Not only is the rectum apt to be loosened in its attachment, but the whole connective tissue; and I think that attention should be given to drawing up the pelvic peritoneal tissues taut and with them the connective tissue at the sides of the pelvis. When there is rectocele, we should perform a broader operation upon the posterior wall of the vagina, and draw up the connective tissue from the sides of the rectum.

Dr. Leonard Freeman (Denver, Colo.): I desire to say just a word on this subject. In the treatment of most cases of prolapse the simplest operation is the best, as it generally is elsewhere. I have been doing a very simple operation for a number of years, which is based also on the use of fascia. A strip of fascia lata, as wide as a finger and folded once upon itself longitudinally, is threaded through the channel

1. Line of cleavage for the removal of tubes and fundus.

2. The tube and fundus removed. Lateral portions of the body and broad ligaments for suspension.



3. Fundus having been removed, the lateral portions are held by forceps to be stitched over the fascia on either side of the wound.

made from side to side through the upper portion of the fundus of the uterus without penetrating its cavity. A small incision is made on each side, and a pair of forceps shoved through, and with it the fascia is grasped and pulled into place. The fascia is then brought around the lower ends of the recti muscles, and the extremities are anchored to each other and to the adjacent structures. There is no danger of infection, and it takes but a few minutes to do the operation. The bladder and vagina are held in place with great certainty, owing to the extreme stability of the uterine anchorage, which remains permanent. A cervical stump from which the uterus has been removed can thus be suspended in case of prolapse, and the trouble will not recur.

I have had occasion to re-examine a number of these patients afterwards, and have seen no recurrences. On one occasion I had to open the abdomen for another purpose, and could see distinctly that the fascia lata held the uterus absolutely in place, after a year and a half, firmly against the auterior abdominal wall without any stretching and without any atrophy, of which Dr. Byford speaks. The fascia lata becomes incorporated with the substance of the uterus and with the abdominal wall.

Dr. Collins (closing): Dr. Ricketts spoke to me some time ago, and at that time he suggested the use of a trephine to ream out the cervical canal, but I thought the trephine would result in more damage and the end-result would not be so good. However, the suggestion is a good one, and the cervical canal can be cut out with a sharp knife. The cervical canal can be dilated so as to afford drainage down into the vagina.

The operation of Dr. Benjamin's does not differ materially from the Kocher. In one case I had a recurrence of the prolapse after the Kocher operation. He lets the sides of the uterus in there, and the result depends upon the adhesion of dissimilar structures. I do not think Dr. Benjamin's operation changes that a particle, and for that reason I have thought it necessary in my own work to devise something else.

What Dr. Byford has said is very true, and the operation should be followed by perineorrhaphy or something else that restores the pelvic plane. I should have said that in my paper.

In regard to Dr. Freeman's operation: These uteri are often elongated, particularly the cervical part, and I have wondered whether by a fascial strip through the top of the uterus one is enabled to draw it up sufficiently far. It may be that his operation is simpler and better.

ARTIFICIAL VAGINA, UTILIZING A SINGLE PORTION OF THE ILEUM

AMOS W. ABBOTT, M.D., F.A.C.S.,

MINNEAPOLIS, MINNESOTA

This paper, instead of attempting to cover the entire subject of artificial vagina, will discuss only the advantage of using a single limb of an ileac loop in place of the entire loop, nor will the moral side of the question be taken up. Suffice it to say that the psychic effect on the woman, in the writer's opinion, is often a sufficient reason for the adoption of the operation, the marriage or not of the individual being of secondary importance.

Since Baldwin, in 1904, proposed to make a mucous lining for an artificial vagina by drawing down a loop of intestine, and, in 1910, reported four cases of his own, the operation has been done successfully in fifteen cases up to 1915. The number of cases reported and unreported up to date would probably reach thirty, perhaps more. In all but one, as far as known, the technic suggested by Baldwin has been followed,—that is, utilizing a loop of the ileum, and dividing the septum later when agglutination between the two limbs had become accomplished.

The one exception is a case reported by Wallace (Buffalo Medical Journal, February, 1911), in which he made use of the sigmoid, using only one limb of the sigmoid loop.

As the ileum may be distended to the diameter of

one and one-half inches without injury to its coats, and as one side of the loop is just as long as the whole loop, I used a single limb of an ileac loop in the following case, referred to me because the young woman had never menstruated.

Miss B., aged 26, a fine specimen of young womanhood, with chest and breasts fully and beautifully developed, of perfect feminine build, and with strongly marked feminine characteristics. There were definite menstrual molimina, but there had been no vicarious menstruation. The external genitalia were fully developed with abundant hair. There was no vagina except a cul-de-sac 1 cm. deep. Rectal examination failed to disclose any trace of uterus or ovaries in the pelvis. In a left inguinal hernia there was a body corresponding in size and shape to an ovary.

She very much wished to consummate a marriage with a young man to whom she was already engaged.

In March, 1917, I operated. A vertical incision was made through the little vaginal cul-de-sac. After finding the loose connective tissue separating the vagina and rectum, and following it as far as the pelvic peritoneum, the opening was enlarged laterally by stretching to two inches. The cavity was filled with iodoform gauze. A low median incision was then made in the abdominal wall and a suitable loop of ileum selected. (Fig. 1.) This at the distal base of the loop was about nine inches from the ileocecal valve. Two clamps were applied at the extreme end of the loop and two at the base of the loop on the proximal side, and the gut was divided between the clamps at both of these points. End-to-end anastomosis of the proximal and distal openings, with suture of the mesentery, was done, leaving a single leg of the gut with a clamp at each end, followed by suture and inversion of the upper end, with the clamp still on the lower end. (Fig. 2.) The gauze, in the new vagina, being removed, a long curved forceps was carried through the vulval opening, down the new vaginal tract, and forced through the peritoneum at the lower end of the new vaginal opening. This opening was sufficiently enlarged, and the forceps was applied to the bowel, replacing the clamp controlling the lower end. (Fig. 3.) The gut was now drawn through the vaginal opening to the vulva and the abdominal wall closed. (Fig. 4.) The lithotomy position was resumed, the gut sutured around the vulval opening, and its lumen filled rather tightly with plain gauze. The gauze was left in the gut for seventy-two hours.

Fig. 1

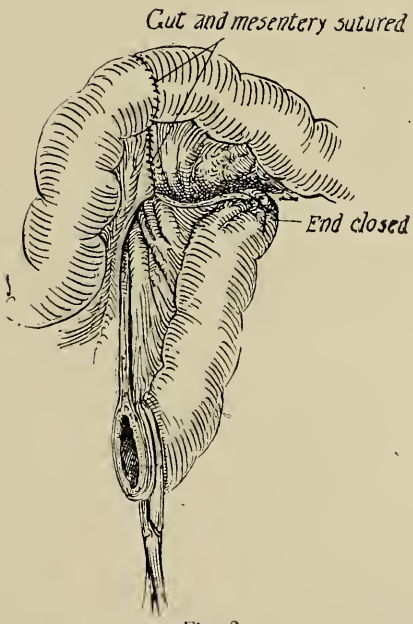


Fig. 2

Fig. 3

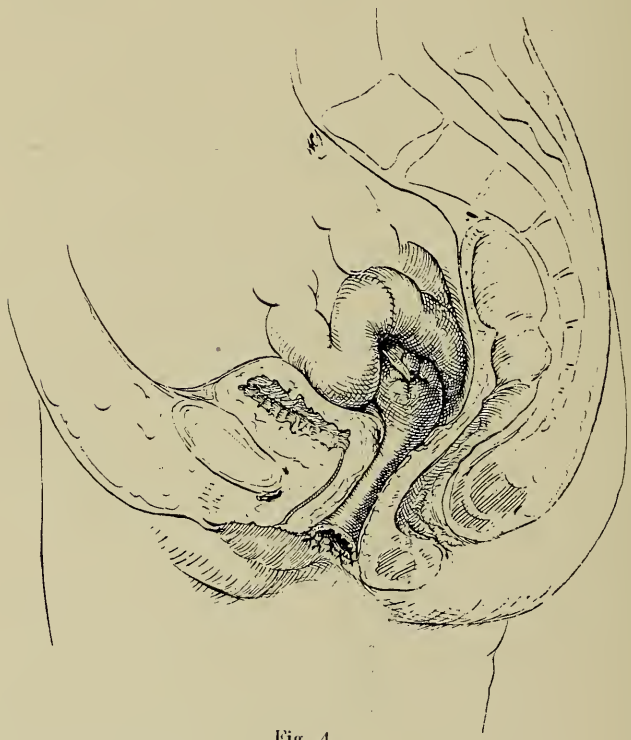


Fig. 4

At the end of two weeks the patient was examined. There was a tendency to contracture at two points, first, at the vulval opening and, secondly, where the gut passed through the peritoneum. Gradual dilatation and the use of suitable plugs readily overcame the tendency, and she now has a satisfactory vagina as shown by the *x*-ray obtained by using a soft rubber dam tube 1 inch in diameter filled with barium and inserted in the vagina. A larger tube, if available, could have been used. There is no excessive discharge or odor. (Fig. 5.)

In making the new vaginal opening one should be careful to seek the natural line of cleavage,—the loose connective tissue between the vagina and the rectum. (Fig. 4.) This line can best be found after the vertical incision is made, and can then be followed by blunt dissection with the certainty of not piercing the bladder or the rectum, and with almost entire freedom from hemorrhage. This line of cleavage in women without a vagina corresponds quite closely in direction with the direction of the vagina in normally developed women. It is perhaps slightly more horizontal. (Figs. 6 and 7.) In a woman lying upon her back, the vagina, beyond the levator ani edge, is much nearer the vertical than is generally indicated in the illustrations in our text-books. For this reason a long and full-curved forceps should be used in drawing down the gut into the vaginal opening.

The advantages of using one limb of the intestinal loop instead of both are the following:

1. It takes less of the bowel.

2. It requires the closure of only one end of the utilized limb, instead of both ends of the loop.

3. A second operation to divide the septum is unnecessary. The operation is complete in one sitting.

The operation is not in itself difficult for one accustomed to abdominal surgery, but requires great care and accuracy, whether done by the one-limb or the full-loop method.

So far as the writer can learn there have been no

deaths from any of the Baldwin operations, and the results have been functionally satisfactory.

As between the use of the ileum and the sigmoid by either method there is little to choose except that the use of the ileum is easier, and is considered safer by some operators. The use of the entire loop of intestine is certainly unnecessary.

A concise and interesting article by Novak, in Surgery, Gynecology and Obstetrics for November, 1917, and closely related to the subject of this paper, discusses the history, etiology, pathology, etc., of congenital absence of the uterus and the vagina.

DISCUSSION

Dr. Emil G. Beck (Chicago, Ill.): Dr. Abbott has furnished us with a very delicate subject for discussion, and the first thing that arises in our minds, is whether we are justified in performing such an operation for this particular defect. There is a medicolegal side to this. In the first place, the prospective husband must certainly be informed that there is going to be an artificial vagina made, and that his wife will not be able to bear children in the absence of a uterus. Furthermore, the question arises, will a vagina which is constructed from the intestine fulfill the purposes of a natural vagina. We know there is a difference between the lining membrane of the vagina and that of the intestine; and whether the mucous membrane of the intestine will undergo a change after a while we do not know. Furthermore, we know that the musculature of the vagina differs in a certain degree from that in the intestine. One has a peristaltic action, but the other has not. Whether the operation should be performed or not, depends more upon the patient than upon the doctor, because the patient might be in a desperate condition and might want to have the operation done in spite of the fact that the artificial vagina would not fulfill its purposes.

Dr. Henry T. Byford (Chicago, Ill.): The question for discussion in Dr. Abbott's paper is, I believe, whether a single section or cylinder of transplanted intestine will make a good vagina, and can be depended upon instead of the loop or double-barreled type originally made and used in Germany.

Now, you cannot have too much of a good thing, and I

believe that is the German idea. By throwing both sides of the loop into one you have more vagina, two in one; in other words plenty, and possibly a little to spare. We know that when a mucous membrane is thrown out of function—I mean out of normal function—the glands and their supporting fibrous and subservient muscular tissues undergo atrophy, and the lumen of the tube is, for practical purposes, obliterated. The only hope is that frequent dilatation and exposure to air may result in the conversion of the cylindrical-cell epithelium into pavement epithelium. Even then some contraction must take place, and the loop or double tube, having twice the surface, will last twice as long for the purpose for which man, not God, intended it. As a first aid it may last until the interested parties arrive at the age of discretion, and are willing to put up philosophically with the advent of the inevitable, and settle down to the enjoyment of that quiet life that in the course of human events must finally come to all those who survive to fill out the time allotted to man upon the face of the earth.

Dr. R. E. Farr (Minneapolis, Minn.): I had one of these cases a short time ago in which I made use of a loop of the intestines, and I obtained a very excellent artificial vagina. The bowel pulled loose a little at the base, and in an effort to suture it once more to the vaginal mucous membrane I went through the rectal wall, producing a vaginorectal fistula, which I have since closed. The patient is in the hospital now.

There are some points which impressed me during this operation. In the first place, I found that if we pull down the loop with the two limbs upward and the base of the "U" downward there seems to be more relaxation. In this patient the mesentery was a little short. I also made a mistake in making my anastomosis behind the excluded loop. I drew the loop upward, resected it, and made the anastomosis below, and then found that I had to bring the loop down over my anastomosis. It would have been better to leave the anastomosed bowel in front. In this patient I had the misfortune to have my forceps break after they had been clamped on the loops of her vagina for a few days, but had not yet necrosed through.

The physical findings in this girl were these: She had, to begin with, a very small vagina, about an inch and a half long. The labia and clitoris were normal. She had perfect ovaries and tubes, and just a slight thickening along the round ligaments,—a mere suspicion of a uterus. She came to me

because she wanted to get married. She had attempted sexual intercourse, and had failed. She had normal libido sexualis, and was anxious to get married.

One observation made on this case is very interesting. I had her come in every two weeks so that I could keep tab on things, and examination showed that she had quite a marked secretion of white mucus, more than a young woman would have who had not had sexual intercourse. The intestinal mucous membrane does secrete a good deal, and I do not see why, with a normal blood supply and with things exactly as they are in the abdomen, even though not passing fecal content along, the intestine would not continue to secrete and continue to live.

Dr. Abbott (closing): I am very glad my paper has put the members of the Association in such a happy frame of mind; but there is a serious side to this question. It is not all laughter. These poor girls are all right except in that one particular, and, as I have said before, while I would not operate on all cases, there are certain cases in which I think any of you would adopt some method to give these poor girls a chance to go on with their lives as they wish to do.

In regard to the condition of the mucosa: A long time after the operation is done, I am afraid my dear friend Dr. Byford has not followed the literature in these cases. It is stated by Baldwin, possibly by Schröder, that the function of the new vagina has been maintained. The mucosa is changed to some extent; the secretion becomes less. In my case there was very little secretion after the first week or two. The fact is that it is not the bowel which contracts. If one loop of ileum is good enough, use that. There is no occasion to use two loops, as you see by my illustration, one is sufficient for ordinary purposes.

Dr. Byford's experience is similar to that of all of us. We put in a lining of skin, and so anticipated Dr. Beck a good many years, but the very thing, the inlaying of skin, which caused our failure, makes his work successful in closing fistulæ. Ferguson came the nearest to it, in that one of his cases was fairly successful for a time, but eventually closed.

EPITHELIOMA INVOLVING THE AXILLA: REPORT OF A CASE

THEODORE F. RIGGS, M.D., F.A.C.S.

PIERRE, SOUTH DAKOTA

The case I wish to report was a puzzling one, and it is only recently that I think I may have stumbled upon an explanation as to its origin.

CASE

T. T., a ranchman, aged 55, came to me in October, 1915, with a lump in the subcutaneous fat of the left post-axillary region.

The family history was negative, as the patient knew little to tell.

The personal history obtained at that time was also negative except that in 1906 he had had a small ulcer removed from the right lower lip under local anesthesia. This ulcer had followed touching his lip to a bridle bit which he was "taking the frost out of" before saddling a horse. At this place in the original history another entry should have been made, but as it was not I will take it up later.

Present illness: The patient had noticed the lump in the left post-axillary region for about four years, and its growth had been gradual. It was a typical lipoma, about the size of half a base-ball, and had never given any discomfort except for being in the way. I advised its removal at his convenience.

Physical examination showed a well-nourished, mus-

cular, medium-sized man; temperature and pulse, normal; urine, normal; no glandular enlargement in any part of the body. On February 10, 1916, I again saw the patient at my office, and found no change in the growth. He made an indefinite appointment for its removal upon his next trip to town.

Twelve days later (February 22, 1916), in the evening, he again came to the office with the story that on February 20, while driving stakes with a maul, he had noticed a sudden pain in the region of the growth followed by a rather rapid painful swelling, which soon filled the entire axilla. It seemed probable that this was a hematoma.

I did not make a complete physical examination at this time, but did note the absence of palpable glandular involvement in the neck and opposite axilla. On February 23, under ether, I operated and found, in addition to the lipoma, a large semifluid blood-clot filling the axilla. At first I thought that this was the only condition present until I noticed what seemed to be an ill-defined, somewhat fibrous capsule, which in places appeared to infiltrate the surrounding tissues. Not being able to rule out malignancy, I cleaned the axilla thoroughly, even to removing a portion of the pectoral muscles, to which this peculiar capsule seemed especially adherent. Sections of the tissues removed showed in one portion a simple lipoma and in another a blood-clot surrounded by a thin layer of fibrous tissue. In no section were we able to make out anything suspicious of malignancy.

The patient made a rapid uncomplicated recovery, but on the day that he left the hospital, ten days after the operation, I noticed an involvement of the glands above the outer end of the clavicle. As these glands were soft and rather tender I thought them to be of mild inflammatory or irritative origin and did not remove one for examination.

The next time I saw the patient was on July 26, 1916. He had just returned from a business trip to Chicago, and while there had seen Dr. Ralph C. Brown. I wrote Dr. Brown a brief outline of the case as I had seen it, and asked for a report of his findings, which he promptly and kindly sent me, and which were as follows:

We found no evidence of regional recurrence in the neighborhood of the operation scar, but the glands in the left side of the neck, while not greatly enlarged, were so deeply seated and fixed as to suggest malignancy. Removal of one of the glands and microscopical study showed the typical picture of squamous-celled carcinoma. Careful search for the primary process failed. Stomach analyses showed normal findings. *X*-ray examination of the stomach and mediastinum were negative. No occult blood in the stools. Uranalysis, negative. The blood showed the findings of a moderate grade secondary anemia. It is difficult to account for the presence of squamous-celled carcinoma in these glands in the absence of any primary skin or mucous-membrane lesion.

I next saw the patient on December 16, 1916. Up to the first part of the month he had felt perfectly well, had done his usual work, and except for slight edema of the arm had suffered no inconvenience. Early in December, however, he had noticed a soft, dark-colored swelling low down in the axilla. This had gradually increased in size and was tender and evidently contained fluid. Under local anesthesia I opened this swelling and evacuated about 100 c.c. of dark-colored watery fluid, which did not clot. A portion of the deeper tissues and one of the supraclavicular glands were also removed for microscopic examination. Portions of each tissue were sent to Dr. H. L. Ulrich at the Minneapolis Clinical Laboratory for his opinion. They showed, in one, epithelioma of a lymphatic gland and, in another, epithelioma involving muscle.

The situation was gone over thoroughly with the patient in a consultation with his family physician,

Dr. J. M. Walsh, and the advisability and possibility of a radical shoulder-girdle amputation was discussed. We rather urged the operation as being the only hope, but the patient chose to delay. The loss in his general condition was noticeable during the succeeding two weeks, and it was our feeling that the condition had gone beyond surgical relief. However, wishing to have the opinion of another as to this and also as to the origin of the epithelioma which had been from the first an enigma to us, I advised the patient to see Dr. H. L. Ulrich in Minneapolis as being best fitted to make an unbiased examination while having a direct knowledge of the character of the growth.

Dr. Ulrich's report is as follows:

Rather pale man, with small superficial ulcer on the left lower lip, a white smooth scar on the right side of the lower lip, some loss of tissue and a hemorrhagic point on the helix of the left ear.

Dentist reports three abscessed teeth, the right maxillary sinus infected, the lower jaw negative, and no dentigerous cysts.

Throat atrophic negative.

Thorax: the right larger than the left, slightly more resonant, left some impairment throughout, crepitant rales in front near base.

Heart, negative.

Abdomen, negative. No glands anywhere except on the left anterior neck, several marked glands in the lower anterior triangle, hard and discrete.

Left arm edematous throughout. Large scar in left axilla. Tissue in axilla edematous, hematoma discharging from a small opening in the posterior axillary line.

Blood findings: hemoglobin, 75 per cent; reds, 6,000,000; whites, 12,000; differential, polynuclears, 82 per cent; eosinophiles 1 per cent; small mononuclears, 13 per cent; large mononuclears, 3 per cent; transitionals, 3 per cent; Wassermann, negative.

Urine, negative.

I wished to share with someone the question of judgment in regard to operation, so I called in Dr. A. A. Law, who after going over the case and findings gave a rather doubtful prognosis. While my feelings in the matter are the same as his,

I strongly urged the patient to have an operation. I had a feeling that the whole thing depended on the amount of involvement there was in the axilla. After having settled all this, it occurred to me as an afterthought that there might be involvement of the left lung, and therefore I urged the patient to have an *x*-ray of his lung made before he went back to you. He consented to do this, but failed to keep his appointment with Dr. Bissell, and I have not heard from him nor seen him since.

In regard to the origin of the epithelioma, I wish to say that there is no other avenue open to me except the lip. Dr. Law thought possibly a transverse metastasis had occurred from the old scar on the right lip. I do not think there is any mediastinal involvement. There is more apt to be direct pleural involvement. I am not so certain that the recent ulceration of the lip is the origin of the metastases in the glands of the neck.

While in Minneapolis the patient on advice of friends saw two other doctors, one of whom made an *x*-ray examination and reported "pleural and lung involvement."

On January 27, 1917, the patient returned home and asked that he be given the chance of an operation. Accordingly, on January 31 we did an interscapulothoracic amputation of the left shoulder with careful hemostasis and nerve-blocking. We experienced no unusual difficulty, but were surprised to find an extensive involvement of the lymphatics in the upper or occipital portion of the posterior cervical triangle and under the edge of the trapezius. Their dissection and removal caused a delay in the completion of the operation, which had its effect upon the patient, and he left the table in none-too-good condition, but rallied quickly and appeared to be doing well. In the early afternoon, however, about two hours after his return to his room he suddenly gasped a few times and died.

The post-mortem examination, briefed, is as follows:

Lips, gums, tonsils, and tongue, negative. No glands in submental region. Breasts, negative. Trachea, esophagus,

stomach, intestines, and liver, negative. Bladder and prostate, negative. Lungs showed small calcified areas of tuberculosis in the apices, and the right lung in its lower and middle lobes was spotted by six or eight fresh emboli. The pleuræ were clear throughout. The heart was negative. The anterior mediastinum contained a chain of involved glands which showed the typical picture of squamous-celled carcinoma. This was the only place where metastases were found.

The foregoing is a history of the case as it was obtained and as it developed from October, 1915, when the patient came to me in regard to the mass that was diagnosed and proved to be a lipoma. We were never able to determine the origin of the epithelioma, and it was only while collecting the data for this report that I remembered having done some work for the patient at an earlier date. On looking this matter up I found that on June 6, 1914, under local anesthesia I had removed a small tender mass from the skin of the upper part of the left ear. This growth had followed the repeated frosting of the patient's ears during the winter of 1913-14, and was removed because of the discomfort it caused when his head rested on it at night. No microscopic examination was made of this tissue, I am sorry to say, and I have no means of proving this was the original focus. If it were, it is reasonable to believe the metastases in the cervical lymphatics were lighted up and spread by the injury to the lipoma and the subsequent operation. There is the possibility that the origin was an undiscovered focus in the hand or arm.

The peculiar coincidence of frost-bite as a cause of the growth in the lip and in the ear of this patient is of interest as a possible cause of the epithelioma.

FOR DISCUSSION SEE PAGE 178

CARCINOMATOUS MASTITIS, WITH THE REPORT OF A CASE

WILLIAM M. HARSHA, M.D., F.A.C.S.,

CHICAGO, ILLINOIS

The case I have to report is one of carcinomatous mastitis. It is also known as Volkmann's carcinoma, acute cancer, and fulminant cancer of the breast. The case was of unusual interest to me because it was the first one of the kind I have seen, or that I recognized.

The patient was a young, unmarried woman, Jewish, aged 29, who came to St. Luke's Hospital on September 30, 1916. When she was admitted to the hospital she complained of a pain in the back, in the upper dorsal region, and in the areas to which the sensory nerves of that part of the spine are distributed. She complained more of that pain than of the tumor. She presented a large tumor in the left breast. Her family history was negative. Her father died of heart disease; her mother is living and well; three brothers and two sisters are living and well. As to the personal history, there is no history of injury of the breast. She had tonsillitis frequently up to two years before, when her tonsils were removed. She had measles during adolescence. She began to menstruate at the age of twelve.

Physical examination showed a very large, prominent, distended left breast, symmetrical, red, hard, and hot, of the typical orange-skin type or pig-skin

appearance, which is characteristic of this particular form of carcinoma of the breast. There was no history of venereal disease.

As to her present trouble: the tumor began in November of the previous year, less than a year before she came to the hospital. The tumor was not distinct, but she described it as a swelling which gradually extended to involve the breast. There was no pain until seven or eight months after the development of the swelling, but there were redness and heat after two or three months.

This case was not observed by any physician because she was under the care of a Christian Scientist up to this time. We have to take her statement for the development of the case. The redness and heat and tenseness increased gradually after two or three months until the time we saw her, the last of September. Six weeks before she was admitted to the hospital she began to have pain in the back. This pain was in the dorsal spine between the shoulder blades, and extended around to the left side and even sometimes involved the left thigh. It was especially for pain that she sought relief when she came to the hospital.

Physical examination shows a fairly well nourished patient. She was stout before this began. She has lost twenty pounds. She was paler than normal. She had lost strength and sleep from the pain. The opposite breast was normal. The body in every other respect appeared to be normal, except enlargement of the axillary glands on the affected side. She had a temperature during her short stay in the hospital ranging from 97° to 100°; the pulse ranged from 95 to 105, and the respirations from 20 to 26. There was tenderness along the upper dorsal spine, especially along the sides.

When I saw her at first this tumor seemed to me like an unusual form of mastitis, like a subacute in-

fection of some sort; and one of my colleagues in St. Luke's Hospital agreed with me that it was probably of that type, with a metastasis in the spine. A section was removed from the breast, and examined at the laboratory, and the first report that came back was it was an inflammatory growth; but when Dr. LeCount examined it carefully he sent back a report of carcinoma. The other laboratory examinations showed that the urine was negative, and the blood was deteriorated, being reduced to 850,000 for reds, the whites ranged during three or four counts from 11,500 to 14,500, and the Wassermann was negative. The tuberculin test was negative. An *x*-ray examination was made of the spine to see if any bony change was present, which was negative. The hemoglobin was 48 per cent. Those were the chief findings in the laboratory. I should say also that there was a culture made from the blood, which was collected at the time the section of the breast was made for microscopic examination. The culture of the blood was negative.

This breast presented a rather dark red color, with enlarged superficial veins. Further than that, we could not find anything else until two weeks later, and then we found dullness in the left chest in the posterior axillary line. Dr. Archibald Church saw her with me with a view to determine the character of the pain or the cause of the pain in the spinal centers, and he gave as his opinion that metastasis had taken place along the lymphatics accompanying the intercostal arteries and involved the sensory nerves. As her condition was so advanced, and blood-deterioration so great, and metastases undoubtedly so extensive, no operation was advised. We treated her by deep through-and-through *x*-ray exposures, with the Coolidge tube, and this treatment seemed to check in some degree the local process; and it seemed to relieve the pain to some

extent. She had *x*-ray exposures of the spine, as well as of the breast. One part of the breast showed a little tendency to break down, but under the *x*-ray exposures that tendency was arrested, and the breast seemed a little softer after one series of *x*-ray treatments. I would say also that the wound from the section we made of the breast healed up under the *x*-ray exposure without any ulceration or breaking down. In December she had a second series of *x*-ray exposures, after which she went home, and came back to the hospital two or three times to have these treatments repeated. She grew rapidly worse, and died the middle of December, a year ago.

Dr. Moody of the St. Luke's Hospital laboratory made a post-mortem examination, but we could get consent for only a partial post-mortem. I have a gross section of the breast which I will show you. Unfortunately, Dr. Moody left St. Luke's Hospital shortly after that time, and has not been able to give me a complete record of his post-mortem examination. In making a section through the breast clear down and through the intercostal muscles, we find carcinomatous involvement, and there was a pint of fluid within the chest. We took out a section of the spleen, which showed gross changes. As I have previously said, the axillary glands were extensively involved. We took out sections first of the posterior nerve-roots, and I cannot report at this time on the section of the spine, but the nerve-roots show that gross changes had taken place, apparently metastases. I had a talk recently with Dr. LeCount in regard to the slides, and he said they did not differ much from ordinary carcinomatous slides.

The type of carcinoma is of the medullary rather than the scirrhous. These tumors have sometimes been reported of a mixed type and not adhering to any single type.

Leitch has investigated the cause of this orange-skin or pig-skin appearance of the breast, and says that deep under the corium the lymphatics are so thoroughly filled with carcinoma cells that they give it this prominent appearance, and that the pitting at the hair follicles is an exaggerated depression of the hair follicles due to the prominence of the surrounding tissue. He also says in the cases examined by him the nests of cancer were surrounded by round-celled infiltration of a lymphocytic character. Dr. LeCount did not find that in this case. But the characteristics of this growth were that it was diffuse, symmetrical, and presented the general character of a carcinoma spread throughout the whole tissues, including the skin.

Dr. Finney, in his article in Keen's Surgery, says that this acute form is fortunately rare and proves rapidly fatal, the whole course lasting at times not more than two or three months. It appears soon after the puerperium and complicates an ordinary mastitis, in one case engrafted upon a tumor of years' duration. The virulence of these tumors is so great that by the time the diagnosis is made operation is futile, as internal metastases have developed. Both the scirrhous and the medullary types have been found.

The late Dr. William L. Rodman reported four cases five or six years ago in which he made the statement that nearly as many of these tumors occur in the non-puerperal as in the puerperal; and he described two types of this disease, one a primary carcinomatous mastitis, such as we believe we had to deal with, and the other a discrete and apparently benign tumor, lasting for some time, and then suddenly lighted up to malignancy by the puerperal state. In one of Rodman's cases a prominent surgeon had incised the breast with a diagnosis of ordinary mastitis. In that breast there were some deposits of pus. Dr. Rodman says that he thinks it is nearly as frequent in the non-pregnant as in the pregnant. He cites four cases.

The prognosis is bad. An essential point is to differentiate primary carcinomatous mastitis from the grafting on of malignancy to a condition that has been present.

I recall one report, but I could not find it in my last search of the literature, of a case successfully operated on and reported in the Bulletin of Johns Hopkins Hospital some four or five years ago. At that time the report stated that the woman had not been well enough to count her case a cure.

Very little can be promised in these cases unless an early diagnosis is made, and the main point of practical importance, it seems to me, is that we should bear in mind the existence of this type of carcinoma, and act promptly in making a diagnosis before it is too late to operate.

DISCUSSION OF THE TWO PRECEDING PAPERS

Dr. Daniel N. Eisendrath (Chicago, Ill.): Each of these papers is exceedingly valuable. I believe I can help Dr. Riggs solve the problem in his case, because I happened to look up the literature in regard to somewhat similar cases two months ago.

In order to understand this subject we have to know a little of the embryology of the breast. The breast is an infolding of the epithelium from the skin in the embryo which extends from the axilla down to the region of the umbilicus in animals, and from that infolding the breast develops. In the human only one portion of the infolded ridge of epithelium develops. In lower animals, for instance, in dogs, we have a series of processes which extend all the way down the abdomen. You have all seen supernumerary nipples in the human female up in the axilla.

I had a case in consultation with another practitioner in Chicago in which we had what was diagnosed a tumor of the breast. It apparently developed primarily in the axilla of a woman of sixty, and the tumor presented all of the clinical characteristics of a carcinoma of the breast; and the breast itself, when it was removed radically, showed absolutely mic-

roscopically and macroscopically no traces of any tumor. In a recent article by Zeitz the author takes up this whole subject, and goes into the origin of these tumors. Some believe that when we have tumor growth in the axilla, we have what Dr. Riggs had, and not a metastasis. The lymphatic zone is not from the axilla. There are skips or jumps, so to speak, in lymphatic drainage, but such a peculiar skip, or such a big skip, would hardly be possible to come from the lip down the axilla and, secondly, down under the clavicular region. The two views are that the primary growth of the axilla originates from the sebaceous glands of the axilla, which gives rise to a glandular tumor; and the other view is that we are dealing with primary growths, a so-called axillary process, in the upper part of the breast ridge. The only question comes as to the examination of the primary growth which Dr. Riggs removed. He said it was a blood-cyst surrounded by connective tissue; and unless he examines it microscopically he is apt to overlook nests of epithelial tissue which would have cleared up the diagnosis. If secondary growths in the glands were squamous epithelium, they could be easily mistaken in the gland, and it is hard to tell metastases from the primary growth. I am of the opinion that what he was dealing with was a primary epithelial axillary mass, either from an old axillary process or probably from the sebaceous glands, and the fact that it looked squamous in the secondary growth makes me believe it all the more. I believe it was a primary growth of the sebaceous glands of the axilla with secondary deposits in the lymphatics that drain at the outer region of the axilla.

Since reading Zeitz's article two years ago in the *Annals of Surgery* on this subject,—and it was a perfect revelation to me,—I have never heard of the thing, yet I have been on the watch for these cases ever since. We have had a large number of mastitis cases, and I have made up my mind that when a woman's breast does not yield to ordinary treatment, and the breast begins to get hard, I am on the watch for it. I saw a similar case in a woman of fifty-five in whom the pathologic process pursued a rapid course, as in Dr. Harsha's case, and in this case section of the tissues showed that the growth was apparently in the tubules of the nipple, and not the parenchyma proper. Dermatologists claim it is a primary disease of the nipple with secondary changes in the breast, and surgical pathologists claim it is a primary carcinoma of the tubules with secondary interference of the return circula-

tion. I believe the last view is the correct one,—that the woman had primary carcinoma of the tubules. We have a drawing, and have made photographs of the tissues. As in Dr. Harsha's case there was a parchment-like condition. The whole region of the lower half of the breast was like pigskin, and there was a tremendous chronic edema. The patient was somewhat relieved. The more rapidly they grow, the more rapidly they invade the lymphatics.

Dr. A. W. Abbott (Minneapolis, Minn.): I do not know of any disease of the breast that is so hard as this to diagnose in the early stages. Most any one will be deceived, and think it is a case of mastitis. The differences that occur to me now are principally two. In the first place, as you follow them there are no soft spots undergoing suppuration. Secondly, there is usually retraction of the nipple. I do not know whether Dr. Harsha noticed that or not in his case.

Dr. Harsha: That was present.

Dr. Abbott: It is present in these cases, but the redness would deceive anyone in the beginning of the disease.

Dr. D. C. Brockman (Ottumwa, Iowa): I want to report a case in point. A woman, forty-seven years of age, came to my office the first of June with the following history: sixty-one days ago she fell and struck her right breast on a chair-back causing a large hematoma to form in the lower hemisphere of the breast. When the black-and-blue swelling subsided she found there was a large, hard mass in its place. When she came to me she had a typical large carcinoma of the lower half of the breast. The axilla was involved extensively. I sent her to the hospital immediately, and the next day did a typical Halsted operation. The microscope showed both the breast tumor and the axillary glands to be cancerous. I told her she probably had a tumor in the breast before she fell, but she is very positive that the breast was normal until after the injury. Notwithstanding her opinion to the contrary we were very certain that she had a cancer of the breast before the injury, and that the injury caused it to develop very rapidly. A single blow might have caused a sarcoma, but probably never caused a carcinoma to grow thus rapidly. She is a large, fleshy woman and will, in all probability, have a rapid recurrence, although she has not reported such recurrence as yet.

Dr. Riggs (closing on his part): I wish to thank Dr. Eisendrath for his explanation of the origin of these tumors.

We had a definite lipoma in the first place which may have blinded the entire thing. I do not know that the lipoma had anything to do with it except as a cause or aid to the injury; and I think, as I stated in my paper, we noticed at the first operation a peculiar infiltration of the tissues. Microscopic sections were made of the first tissue removed, and were negative except as stated.

Dr. Harsha (closing): In my paper I did not give much of the bibliography of the subject, but there was an interesting article published in the *Canadian Medical Association Journal* in 1916 by Schuman, who collected eleven cases, and reported one of his own, before Rodman reported his cases. There have been many cases reported since then.

COMPOUND TRAUMATIC SEPARATION OF THE LOWER EPIPHYSIS OF THE FEMUR

GILBERT GEOFFREY COTTAM, M.D., F.A.C.S.

SIOUX FALLS, SOUTH DAKOTA

In 1904 I read a paper[1] with the above title before this Association, detailing therein the histories of two cases occurring under my own observation. The first patient was seen in consultation in Iowa in 1899, and recovered after resection of a piece of the shaft, made necessary to effect reduction, and wiring the epiphysis to the remaining portion of the shaft; the other case was seen in consultation in Minnesota in 1904, the patient recovering after reduction without resection. I have recently seen a third case, this time in South Dakota, the details of which will be interesting as emphasizing what I tried to bring out in my previous paper, namely, the formidable character of the injury and the danger to life which in these cases occurs from shock, gangrene, and infection.

George I., aged 12, farmer's son, was seen by me in consultation with Drs. Young and Volin at the Lennox Hospital, Lennox, S. D., on September 8, 1917. At 7:30 A. M. the previous day, while driving in a buggy to his work in the field, one of the traces became unhooked. After replacing it he started to get back into the buggy, when the team began to run away, and in reaching for the reins his left foot became entangled in the spokes, and he was dragged for a distance of about half a mile. When picked up it was found that he had lost considerable blood and that the shaft of the femur, sep-

1. Tr. West. Surg. and Gynec. Assn., 1904, p. 461; also Medical Record, New York, lvii, 487.

arated from the lower epiphysis, protruded to the extent of several inches, denuded of its periosteum, through a large, irregularly kite-shaped opening in the soft parts just above the knee posteriorly. Reduction was effected, the extremity put up on a double-inclined plane, and Carrel-Dakin instillation started.

When I saw him, thirty hours after the receipt of the injury, I was able to determine that the fragments were in good apposition, but no pulsation could be felt in the exposed popliteal artery. His general condition was bad. The pulse was 120 and of poor quality, and his temperature slightly elevated. He was very anemic, restless, and mentally confused. The extremity below the site of the injury was warm and of as good color as its fellow. Under the above circumstances it was decided to defer amputation in the hope that the collateral circulation would prove adequate, and, in any case, secure some improvement in the general condition. In both respects we were disappointed. He gradually lost ground, and finally moist gangrene of the entire extremity, from the point of injury down, set in. I was called hurredly five days after the first consultation, and as a last resort did a quick "guillotine" amputation at the mid-thigh, but the patient succumbed shortly afterward.

Examination of the bone specimen, which I now present, shows that it was a case of true separation,—that is, the epiphyseal line was followed throughout the diastasis,—whereas in my first two cases the bone lesion was of the fracture-separation type, the separation following the epiphyseal line throughout the greater part of its extent, and then splitting off a piece of the shaft of the femur, which remained attached to the epiphysis. (The small piece of femoral shaft which I had to excise in my first case in order to effect reduction shows this nicely, and I therefore now exhibit it.)

Dissection of the amputated extremity showed a complete plugging of the popliteal artery. It is presumed that this occurred some time after the injury was received, as the examination made at the hospital shortly after the admission of the patient showed the artery pulsating normally.

With regard to my first two cases: It may be of interest now to mention the present condition of the patients. The first was six years and nine months old at the time of the injury, and is now a little over twenty-five years old. In my first paper, written five

years after the case occurred, I gave comparative measurements and *x*-ray tracings showing the existence of marked genu valgum due to irregular development of the shaft with consequent "bowing." This condition has persisted, the patient having never consented to submit to osteotomy, which I felt would largely correct it. He suffers no apparent inconvenience, and is able to do his share of the heavy work on the farm.

The second patient, injured when five years and nine months old, now eighteen years and four months old, has suffered no inconvenience of any kind since he recovered from the accident. There is no shortening, limitation of motion, or anything else to indicate that he was ever hurt.

In conclusion, without making any deductions, I have summarized the main facts in these cases in the following table:

	Name and Address	Age & Sex	Character of Separation	Popliteal vessels
Case No. 1.	W. G., George, Iowa	6¾ yrs. Male	Fracture	Uninjured
Case No. 2.	T. S., Steen, Minn.	5¾ yrs. Male	Fracture	Uninjured
Case No. 3.	G. D., Lennox, S. D.	12 yrs. Male	True	Probably injured, but not divided

	Operation and after-treatment	Developments	Outcome
Case No. 1.	Resection end of shaft, then wiring to epiphysis. Plaster cast in full extension	Genu valgum	Recovery
Case No. 2.	Simple reduction. Double-inclined plane	Perfect result	Recovery
Case No. 3.	Simple reduction. Double-inclined plane. Amputation six days after injury	Septicemia and gangrene	Death

DISCUSSION

Dr. John E. Summers (Omaha, Neb.): I did not hear the first part of Dr. Cottam's paper, but I have had four of these cases, three of which were submitted to amputation, with one

death, and the other with reduction and a useful limb. All of the cases, except my own, that I have read of, had dislocations of the fragment downward. I do not know exactly why that is. There was recently an article in one of the medical journals giving an explanation of this, but it was not satisfactory to me. In the last case I had the lower fragment as dislocated upward, and the lower end of the upper fragment tore the popliteal vessels, the ends being widely separated when the case reached the hospital three days after the injury. There had been severe hemorrhage, but it had ceased. The extensive, lacerated popliteal wound was infected, but still the leg was alive. I made an incision above alongside the patella, and with my fingers pressed downwards while extension was done by an assistant, to make the reduction. Instead of tying the vessels I left them alone because I was fearful that the manipulation to tie them would interfere with the nutritive vessels that were keeping the leg alive. In this case union of the fragments took place with a useful but stiff leg.

Dr. Cottam (closing): I did not speak of the mechanics of the procedure because I covered this in my first paper, and it is very thoroughly analyzed in Poland's classic monograph. There are two ways in which this injury is commonly produced, one by the extremity being thrown backward in rotation, as when caught in the spoke of a revolving wheel, while in the other instance the patient is running along on the ground and steps into a hole, and the epiphysis is snapped off.

In the cases of rotatory extension the force is applied in such a way as to tear the epiphysis loose, and the epiphysis is more apt to be displaced backward. The weight of the body is forced forward in the case of a patient stepping into a hole while running, and the shaft of the femur is projected backwards and downwards. In the first case it is just the opposite. An important technical part in the treatment is to bear in mind that the epiphysis, being so low down in the thigh, is almost always pulled backward by the tension of the gastrocnemii.

In some of the articles I have read, the method of putting on Buck's extension in these cases is advocated. Putting on Buck's extension with the extremity in the straight position aggravates the deformity because Buck's extension makes more tension on the gastrocnemii, and pulls the epiphysis farther downward and backward. The correct principle, it seems to me, is in the use of a double inclined plane.

The use of the bed-pan, which in cases of plaster casts and

Buck's extension and other splints is such a trial to the patient and such an annoyance to the attendants, is absolutely without any annoyance to either the patient or the nurse when the Hodgen splint is applied.

Aside from the comfort of the patient, it is a great blessing for the doctor. I remember when a broken femur case was a nightmare to me, in the days of Buck's extension and plaster. Now I would rather treat one than an acute appendix.

If the case is compound, the wound is quite accessible, and can be dressed and looked after easily. If union is slow, one can manipulate the ends of the bones at will.

Our results have been most gratifying. We have gotten about an average of one-fourth of an inch shortening, and have had a number of very severe comminuted fractures. We have treated fractures with it at every place in the femur, —from the head to the condyles,—and our results have been quite satisfactory, regardless of the location of the injury.

We believe, furthermore, that there is a class of old people who can be successfully treated by this method, on account of the freedom allowed during its application, that otherwise one would be afraid to make the effort with, where confinement with plaster might not be well borne, and the rolling chair, with non-union, would be the next thing to offer.

While there is nothing new about the splint, still I personally feel that this is one of the greatest advances that has become popular in surgery in the last ten years, for up to this time it was seldom used, and even now has too little recognition. I wish every surgeon and general practitioner in the world could have heard this paper.

A PLEA FOR THE RENAISSANCE OF THE HODGEN SPLINT

FRANK G. NIFONG, M.D., F.A.C.S.

COLUMBIA, MISSOURI

Some two years ago a learned and inspiring presidential address was delivered to this Association on the "Old Art and the New Science of Surgery." In it the fact was mentioned that both the science and the art of surgery are much indebted to some of our Western surgeons. That thought suggested the possible need for this paper. It seems at the present time appropriate that one of the most valuable surgical appliances resulting from our great civil war should be more generally understood and used: I refer to the Hodgen splint.

Glancing at the history of the art of surgery, we marvel at the many procedures handed down to us empirically which accord perfectly with what is best in the modern science of surgery. We admire and wonder at the skill and acumen, the remarkable powers of observation, and the clinical ability possessed by the old surgeons. Many old practices which were proven good by results are now rationally and scientifically explained, and we have the reasons for their being good. Others of these old practices have fallen, not exactly into disrepute, but into something like "innocuous desuetude," and we need a renaissance. They need to be restored.

The appliance about which I wish to speak to you is

one not much used, because of lack of understanding, but one which is in accord with every scientific principle of the modern science of surgery. This is the Hodgen splint. It is an appliance which, if used more generally and understandingly, would give us much better end-results in fractures, and especially in fractures of the femur.

It will not be amiss to know something of the originator of this remarkable appliance, John T. Hodgen. He sprang from the soil, the good, rich, virgin soil of old Kentucky, the same which produced immortal Lincoln. The choicest fruit springs from the pure seedling implanted in the rich, virgin soil. (The multitudes of insect life do not destroy its beauty and wholesomeness as they do at a later period.) John T. Hodgen was born in Hodgenville, Kentucky, in 1826, a pioneer unhampered by too much civilization. He came of sterling stock, was uninfected by the vices of civilization, and was strengthened in mind and character by the struggles and adversities of pioneer life. For knowledge he had a passion. His parents came to Illinois, as did Lincoln's, and there he obtained his common-school education. In Bethany, West Virginia, he secured a college education, and from Missouri State University he received medical education, graduating in 1848. From that time on he made himself a diligent student, a forceful teacher, a most skillful surgeon, and one of the first citizens of St. Louis. He became a great teacher of anatomy, physiology, and surgery. First he taught in the old McDowel College until it became a federal prison; then he went to the St. Louis Medical College. He was a teacher and an authority on fractures and dislocations, and was Dean of this Medical College until his death, in 1882. So numerous and varied were his activities and services during the strenuous times of the Civil war that they can not be recounted in this sketch. Many honors

came to him unsought. His was to serve with all his mind, his heart, his skill. And marvelous was his skill, because his trained hands were directed by a mind keen, alert, and acquainted with all the art then known. His was a quick, incisive mind, a mind thoroughly acquainted with mechanics and the laws of physics, and quick to apply them. He was a genius in the application of his knowledge—resourceful, most wonderfully so. A woman with hair-pins in her hair, a strangling baby, a bistoury, and Hodgen to quickly bend the pin and use the bistoury—and a life was saved.

Fame is mostly vapor or mere camouflage at best. Most monuments of antiquity are now destroyed. Medical fame is rarely more than an abstract name. Ten years ago a memorial service was held in St. Louis in honor of Dr. Hodgen, twenty-five years after his death. Evidently he was remembered worthily and lovingly by his surviving friends and disciples. It speaks well for his work and worth, for most of us are forgotten ere our bodies disintegrate. Good work and advancement in science should not be forgotten, though the author may be. Gordon Buck made a great advance during the Civil War when he invented his extension; Nathan R. Smith did well with his suspension splint; but John T. Hodgen did more when he perfected his suspension-extension splint.

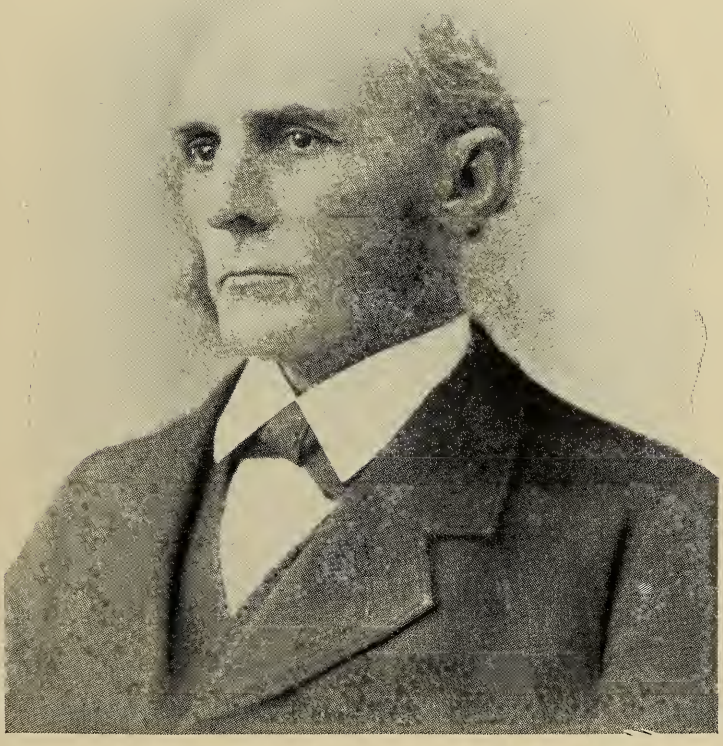
It is exceedingly painful for one trained properly to apply the Hodgen splint in the old St. Louis City Hospital by Hodgen's nephew, the late Henry Mudd, to see various text-books misprint Hodgen's name, and print pictures of the Hodgen splint nothing like what he devised. Recently a publisher showed me a new book on fractures and dislocations. A bare mention and a poor picture of the Hodgen splint damned the book. Another had it "Hodgkin's splint," and merely mentioned it in passing. It is an opportune time I

think for a better understanding of what is the real Hodgen splint, and the basic scientific principles of its use. Numerous war pictures, displaying intricate and complicated devices to secure suspension and extension in the treatment of fractures of the long bones, might well have been simplified and therefore improved with the Hodgen appliance. When we examine the old texts,—and some of the new,—and note the various methods of treating fractures of the femur, we may well imagine we are reading an illustrated history of the Spanish Inquisition. From such instruments of torture it is little wonder we have such deplorable end-results in fractures of the femur. Sergeant Price Martin (Surg., Gynec. and Obst., December, 1915) did a creditable work for the Mayo Clinic when he tabulated the end-results of 242 cases of simple fracture of the femur from the Philadelphia hospitals. All were treated by simple Buck extensions.

All this shows that there is much to be desired, both in treatment and results, especially for the aged. The percentage of cured, that is, not crippled, is from 90 per cent in the very youngest, rapidly decreasing to practically none over sixty years. From the ages of sixty to eighty years, 21 lived, 25 died, and only 1 was a really complete recovery. From seventy to eighty years, 7 lived and 15 died, with no complete functional recoveries.

Walter M. Brickner (Amer. Jour. Surg., January, 1917) considers that only three plans are admissible in fractures of the neck of the femur in the aged: Whitman's reduction and immobilization, an open operation, or no treatment. "No treatment" is well said, for no aged person will ever endure the other two procedures and live.

Estes (Annals of Surgery, July, 1916) estimates that only 2 per cent of his femur fractures had accurate apposition, and he now subjects 38 per cent to



JOHN THOMPSON HODGEN

the open operation. Fractures of the neck are maintained in forty-five degree abduction, according to Whitman, and in extension and suspension, which is well.

The Hodgen splint is so simple, and is dependent on such basic mechanical principles, it seems strange that it should be so illy understood and so often poorly applied; but that is a fact. I have never seen a Hodgen splint properly made by an instrument-maker.

The splint must be made and applied *for each case.* After you have seen your patient and made your diagnosis, put on your Buck's extension, and get the patient into the proper room and bed; measure from the perineum to one and one-half inches below the heel; measure four and one-half or five inches for the cross-bar under the foot; measure, on the outside, from this point to the crest of the ilium; go to the blacksmith, and get a piece about three-eighth inch iron and bend it at right angles, according to this measure; bend at the knee both arms of the splint sufficient to make physiological flexion; place hooks midway between the perineum and the knee, and midway between the knee and the end of the splint, with the outside hooks exactly opposite; make a stiff arch from the inner to the outer arm near the perineum to hold the splint rigid and the arms apart; and apply cords to the hooks, the longer to the upper hooks. These cords are hung in the loop of the third cord, which goes to a pulley, in the ceiling preferably, because the longer it is the more mobile the patient may be in bed. This cord is held by a tent-block to regulate its length.

The proper amount of counter-extension and abduction is regulated by the position of the bed.

Now let the splint come down over the limb, and apply the Buck's extension cord to the cross-arm of the splint under the foot. Pin a few loops of bandage from the heel to the perineum; and suspend the limb

in proper position with the necessary amount of extension. Now apply from the heel up four-inch bandage strips, overlapping each time two inches, until the entire limb is resting comfortably in this hammock. The bandages should overlap more closely in the perineum, and be brought around the thigh as high as the crest of the ilium outside.

Now, what are the reasons for maintaining that the Hodgen Suspension Splint is the ideal appliance for the treatment of nearly all fractures of the femur from the neck to the lower third?

First—The application of extension and counter-extension, which is of prime importance, is made with greatest facility.

Second—Suspension and mobility are obtained, making for comfort, and therefore it promotes repair, especially valuable in the aged.

Third—Not absolute immobility is secured, but always enough to prevent displacement; and this stimulates repair and avoids the danger of muscle-atrophy and pressure-paralysis.

Fourth—It is always open for inspection, measurement, massage, and the care of muscle and skin; and this arrangement makes for earlier and more complete recovery.

Fifth—It is easy to graduate the amount of extension, and to make abduction, if necessary, for a fracture of the neck.

Sixth—For compound fracture, the greatest ease in caring for the wound.

Seventh—And not the least to be considered an advantage, are the great comfort and ease the patient may have in bed, being able to move about and sit up, and have all the necessary nursing care for perfect comfort. This is the greatest factor for the aged. If they survive the initial shock, with this much freedom they will be as apt to live as when they are

gotten up and out, with the chance also of having good repair and a functioning limb.

DISCUSSION

Dr. E. M. Sanders (Nashville, Tenn.): I feel that we are greatly indebted to Dr. Nifong for presenting this subject to us at this particular time. I have tried to keep in touch with the method of management of fractures of the femur in the hospitals near the war fronts; and it has been a source of great disappointment to me that so little has been said about the Hodgen splint.

I notice, however, that Dr. Blake has been using this splint recently, and I feel that his results will be so satisfactory that this method will become universal in the war zones. If it is possible to accomplish this, I believe it would be one of the greatest blessings that could be bestowed on the wounded soldiers.

We have used the Hodgen splint for about eight years. After trying every other kind of device and method of treatment for these cases, we were finally persuaded to try the Hodgen splint, although, after seeing it applied, we had very little faith in its efficacy.

The comfort of the patient was the first thing that appealed to us, as we found that it was not necessary to give morphine or other pain-killers after its application. The absolute freedom of the patient in this dressing was alarming to us at first; but we soon found that no bad results came from the freedom which the patient enjoyed, and the moving of the extremity. On the other hand, we got the lesson that the motion was in the hip-joint, and not at the site of the fracture. The small amount of motion at the site of the fracture, we feel, is beneficial and conducive to rapid and proper healing, and not detrimental to the reparative process.

We find that, in treating children, all of whom are more or less fidgety, they are allowed by this dressing to move about over the bed, sit up, and carry on their play, and, altogether, they are a thousand times more comfortable and happy than in plaster or any other kind of dressing that we have been able to find. We have had one patient with a splint on both legs at the same time, and she was quite comfortable.

In adults we find that they get the greatest comfort imaginable, as they can sit up on a straight back-rest, and have their meals, can write and read, and enjoy games with their friends,

and altogether are not invalided, but simply confined to the bed.

We find in older people the splint is still more useful, as it allows us to get these people up so that they do not get pneumonia, and do not become so generally inactive, which results in lowered blood-pressure and hypostatic pneumonia, constipation, and a general toxic condition.

One of the most valuable features of the dressing is the fact that, throughout its application, the patients are practically free of pain, and do not get addicted to drugs.

It is an easy matter to change their beds, give them baths, and manipulate them in any way desirable while they are in the dressing.

You will notice by one of the cuts that a patient in one of these dressings is able to stand on the floor on his good leg, with the dressing applied. Of course, this is never necessary, but is simply taken to illustrate the freedom of the patient without interfering with the traction and proper apposition of the fragments.

Dr. R. W. Corwin (Pueblo, Colo.): Last year it was my pleasure to visit France. I spent some time with Dr. Joe Blake, and saw his device for suspending fractures by overhead supports. It is ingenious, and serves a most excellent purpose.

At our little hospital, Dr. Wm. Senger, with the assistance of the hospital mechanic, has made a frame of iron, instead of wood, that takes less room, may be attached to any bed, and is readily changed from one bed to another.

I recall two old ladies, one eighty and the other eighty-two, now in the hospital, who suffered fractures of the hip, but have been made very comfortable by the use of this overhead support. One is now out of bed on crutches, rapidly improving. Another advantage of the frame is that the patient can help himself by the aid of slings, lifting and turning himself, which is of assistance when the nurse is giving the bath or massage.

Dr. Joseph Rilus Eastman (Indianapolis, Ind.): I was taught in my boyhood to honor the memory of Dr. Hodgen, and in my manhood to appreciate the Hodgen splint. I am indebted to Dr. Nifong for bringing this subject before us today and to Dr. Sanders for his interesting discussion. I subscribe to nearly all that Dr. Nifong and Dr. Sanders have said. The Hodgen splint is an admirable splint for nearly all fractures of the femur, but it is not a universal splint. I

do not mean to say that Dr. Nifong has presented it to us as a universal splint. There are cases of fracture of the femur in which it cannot be used as well as some of the other devices.

I should like to say a word in defense of the Steinman needle and of the other modifications of the old ice-tongs extension. There are occasional compound fractures encountered in civil practice, and there are many compound fractures in war practice which must be dealt with by some device which takes directly hold of the lower fragment of the femur itself. These compound fractures are so often associated with very extensive laceration of the soft parts, and with such serious phlegmonous inflammation and with such fragmentation of the bone, that it would be impossible to apply, and certainly unjust to your patients to keep applied, an adhesive-plaster strap after the Buck's extension plan. You could not get anywhere with that. The traction upon the soft parts would produce so great pain that you would have to remove it. It is in such cases as that that a device like the Steinman pin serves the purpose as no other device can serve the purpose, and I disagree especially with the essayist when he includes the Steinman needle among the instruments of torture. If the Steinman needle is introduced correctly it does not produce pain. It produces less pain than that which is produced by the traction of the adhesive strips in the Buck's extension. If the skin is drawn upward before the needle is bored through, so that there will be no subsequent traction upon the skin, or if the needle is bored through the skin and soft parts, making a canal or bed into which it fits snugly, there is little likelihood of it producing pain. If you make preliminary incisions and put in a Steinman pin and it will not fit, you will get some infection, and traction will produce pain; but, if it is bored through, making its own bed, it will not produce pain. I would like to know from those members who have had experience with the Steinman pin whether it has been their observation that it produces pain.

The word "schmerz" means pain in German, but as a matter of fact, the schmerz clamp does not produce pain. It is made of steel with canthooks that fit against condyles of the femur, the tuberosities of the tibia, the malleoli, or the os calcis.

After the preliminary incisions are made for the use of the Steinman needle, if infection occurs, then pain is produced, but infection does not occur if the Steinman pin is bored clear through all parts, making its own canal bed into which

it fits well. We have had these patients in a water-bath while extension and counterextension were used, with extensive suppurating wounds over the thigh and leg, the water in the bath being filled with all sorts of microörganisms, and yet we got no infection in the track of the Steinman pin because we put it in by boring it through. If you make preliminary incisions you are likely to get infection.

There is a modification of the Hodgen splint—I have not been accustomed to call it that, but it may with perfect justice be called a modification of the Hodgen splint, that is, Hey Grove's cradle splint made of heavy wire.

Dr. Daniel N. Eisendrath (Chicago, Ill.): I endorse every word Dr. Eastman has said. The reason why the Hodgen splint fell into disuse was because Dr. Hodgen himself, although he enunciated a brilliant principle of suspending the femur, forgot one other principle which is most important in fractures of the femur, and that is extension. I do not care what splint you use, in certain types of fractures of the femur of the middle and upper third of the shaft you must have extension. We have come, through the work of Bardenhauer, of recent years to understand the full meaning of the word extension, and no man should undertake the treatment of a fracture of the femur—and Dr. Nifong brought that out clearly in connection with the use of the Hodgen splint and Buck's extension—without a thorough understanding of the principles of extension. If he does not he must renew his knowledge of the pathology of fractures. If a fracture of the femur should exist, no matter if it be of the worst type, the spiral or other type of fracture, the practitioner must understand that extension must be applied in such a way that it makes traction on all of the soft parts, not on the bones themselves; you are not making traction on the bones themselves with Buck's extension, but you are making traction on the envelope of soft tissues that have a tendency to contract, and they are the ones that pull the fragments apart. It is no longer the idea of muscular spasm of soft tissue retraction that pulls the tissues apart. If you apply extension to the envelope on a level with the trochanter, then you get a complete pull on the whole envelope of soft tissues in muscular spasm. That is one thing we must understand.

I want to endorse what Dr. Eastman has said about the Steinman pin. If it is put in properly the Steinman pin is one of the greatest advances that have been made, especially when it comes to compound comminuted fractures. We have a

large number of these cases at the Cook County Hospital which are equivalent to gunshot fractures. A good many of us are going into war surgery, and it is necessary to know the correct principles: first, the principles of extension; second, the principle of the Steinman pin. There is one objection to the Steinman pin. It must not be put in the neighborhood where we have an area of infection. The recent book of Dr. Hey-Groves has been a great help to me in understanding this question. He emphasizes the fact that in two cases of bad gunshot fractures of the femur in which autopsies were held, he is positive that infection was produced by the use of the Steinman pin.

I have had recent experience in a compound fracture of the leg in a boy in which I put the pins too near the os calcis and got infection.

I would like to take exception to what Dr. Nifong said that the Hodgen splint is an ideal splint for the treatment of all fractures of the femur. Dr. Eastman brought out that point very clearly. What we try to do nowadays in the treatment of fractures is to preserve the function of the joint above and below the point of fracture. We do not want them to be pulled out straight and stiff. Dr. Nifong says they should be put at an angle of 15°. The point I want to make is that, if you have a fracture at the middle third of the femur, you can bring the fragments into much better apposition by putting them on an inclined plane than you can by any other method. We have discarded the use of the old Hamilton-Liston splint. We no longer make Buck's extension in a horizontal plane on the bed. The best way of treating fractures of the femur is on the principle of the inclined plane. Personally, I think the principle which Dr. Eastman has enunciated here is better than the Hodgen splint. It does not allow so much play of the limb, and it gives better support. While we use the principle of the Hodgen splint, we put it on an inclined plane, and it makes a steadier pull than if you have something that moves to and fro.

We are all indebted to Dr. Nifong for bringing this subject before us. I believe every one feels that we owe a tremendous debt to Dr. Hodgen for the principle of extension of the whole limb plus placing it in the best axis in which fractures can unite.

Dr. F. G. Nifong (closing): It was not my intention to convey the impression that the Hodgen splint was a universal splint. It was my desire simply to exemplify the basic prin-

ciples of this splint, which, in my opinion, are the very foundations for the treatment of fractures of long bones. Extension is the primary and most essential principle. We add to this other important factors which are scarcely of less consequence. The site of fracture is immobilized, of course, but when we add to this suspension and the mobility secured in this splint, we have added a great deal to our account for recovery. We have added over 100 per cent to the patient's comfort and correspondingly to his chances of recovery. We have made it possible daily to inspect and care for the soft parts, a matter that should be our concern in a simple fracture, as well as in a compound one. It is a good functional recovery, as well as an anatomical one, that should be our aim, and we cannot hope to have that without attention to muscle, nerve, and all soft parts, as well as to the bone. The only properly descriptive name for the splint is the Hodgen extension-suspension splint.

As I have said, extension is the most essential factor to be considered in treating fractures of long bones. Buck's extension is the simplest form, being made through the fascia and soft parts with plaster. The Steinman pin or other direct bone-extension in many cases may prove of great value. However, it looks a bit barbaric to me, and I should not like to have that pin through my femur. In either method of extension, however, there can be added suspension and mobility from the hip-joint with a properly applied Hodgen splint, and thereby secure all the additional advantages of which I have tried to tell you.

The bed-frame, mentioned by Dr. Corwin, is an excellent idea and with the straps for the patient to move himself about in bed much is added to his comfort. If we add much to his comfort we add much to his chances of good recovery. We have been too negligent of the psychological factor in fracture treatment. If we can use appliances making for comfort, instead of instruments of torture, we certainly have better chances for good recovery.

The frame mentioned by Dr. Corwin is not the very best from which to suspend the splint. The ceiling is better, giving a wider radius of movement. Attached to the bed, however, it is possible to move the bed about and even out of doors.

Now, as to the Buck's extension: It does not give an even pull, and much of the weight is lost in friction on the bed. When suspended in conjunction with the Hodgen splint there is always a continuous and an even unvarying pull, and not

near so much weight is required. The adhesive straps may be put on as high as the hip if desired, and certainly always above the knee-joint. No side appliances are needed when good and continuous extension is secured by the splint. The strong fascia lata and muscles give up, and the bones just naturally fall back in place and are sufficiently splinted by the fascia and muscles.

In lacerations, compound fractures, and shell wounds the splint is of greatest value. Indeed, it was devised for war use. It can be spread wider at any point, leaving room for care of wounds. At any point from the foot to the hip the wound can be handled with greatest ease because it is so accessible for irrigation and dressing. Your extension can be accurately regulated to any point, and nothing but suspension may be used, according to the condition being cared for. It has not been my purpose to question the value of many useful appliances for fracture treatment of the thigh, but my desire has been to bring before you the very important basic principles of the Hodgen splint.

SUPERNUMERARY AND SINGLE URETERS OPENING EXTRAVESICALLY

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ROCHESTER, MINNESOTA

The ureter arises as a process from the posterior wall of the lower end of the Wolffian duct. Its distal end normally divides into two branches, which grow into the blastema of the kidney. Each branch then divides and subdivides, and forms the straight and uriniferous tubules and calices. Early in embryonic life, the proximal end of the ureter opens into the lower end of the Wolffian duct, but, under normal conditions, at about the sixth week, the ureter and duct separate and open separately. If the ureter does not become detached from the duct, and accompanies it in its downward course, the ureteral opening may be found in any one of the organs developing from the urogenital sinus.

If the Wolffian duct and the ureter fail to shift before the urorectal septum forms in the cloaca, the ureter opens into the rectum. Apparently this condition is very rare; I have been able to find it mentioned except in reports of fetuses otherwise abnormally developed.

If the ureter continues its associations with the Wolffian duct, it empties into one of the organs developed from the duct, such as the vas deferens, seminal vesicle, ejaculatory duct, or Gartner's duct.

Furniss reports a case of supernumerary ureter with

an extravesical opening, and abstracts an article by Hartman of Copenhagen. Hartman has analyzed 37 cases collected from the literature, 14 of which were supernumerary. In these 37 cases, the extravesical openings were distributed as follows: 6 in the urethra; 8 in the vagina; 21 in the vestibule of the vagina; and 2 in Gartner's duct.

This review shows that the abnormal opening, whether from a single or from a supernumerary ureter, most often occurs in some part of the vagina. In such cases in the embryo, the ureter maintains its connection with the Mullerian or Wolffian duct; however, it very seldom empties into the Fallopian tube or the uterus. Such abnormalities are reported to have been found in the fetus in a few instances.

If the ureter does not separate from the Wolffian duct, the opening may occur in the urethra or in the vestibule of the vagina, and apparently this is the embryonic abnormality which occurs most frequently.

It is possible that this abnormality occurs much more frequently than we are led to believe from the cases reported in the literature, and may be explained by the fact that it is usually very difficult to make a diagnosis of the condition, even though the clinical features are almost always very suggestive. The 37 cases reported by Hartman apparently include all of the cases in the literature at that time (1913). In 14 of these cases the opening was that of a supernumerary ureter; in the remaining 23 cases the ureter was single, or else the exact condition was not determined. Furniss also abstracted an article by Hartman of Liepzig, who had collected 16 certain cases of positive supernumerary extravesical ureters, 12 cases of uncertain supernumerary extravesical ureters, and 7 cases of single-ureter opening extravesically.

Kelly and Burnam describe one case in which a

single ureter opened into the urethra, five other observers reported cases of single ureter opening into the vagina, and three reported cases of supernumerary ureters with openings in the vagina.

Peacock reports an autopsy on a child nine months old, that had four ureters, one of which terminated in the vesicoprostatic urethra.

I wish to add to the cases in the literature reports of two cases, one in which a single ureter opened into the urethra, and one in which the supernumerary ureter opened into the vagina.

A clinical history of constant incontinence of urine associated with periods of normal urination, suggests the existence of a ureter with an opening outside the bladder sphincter. Such a history was characteristic of both of our cases. In the case with the supernumerary ureter, this history has been constant from birth up to eighteen years of age, at which time the patient was operated on elsewhere and obtained complete relief. Her symptoms returned six years later at the time of her first pregnancy, although the incontinence was not so regular or typical as it had been previously. There would be no leakage at all for several days and sometimes for weeks; then she would have a period of incontinence. Following delivery her condition improved. During her second pregnancy her symptoms returned, and persisted until she was operated on.

Our second case was that of a girl twenty-two years of age. The ureter opened into the urethra, and she had had incontinence as long as she could remember. There is one point of unusual interest in the history of this patient: Apparently, for long periods there would be no leakage at night, and at times during the day there would be no soiling. We were unable to explain this until at operation a greatly dilated and thickened ureter was found, which seemed to indicate that the ureter had been obstructed at times and that consider-

able infection existed in the walls of the ureter. Infection was naturally to be expected in this type of ureter in spite of the fact that the urine collected before operation showed only a small amount of pus. Soon after operation a larger amount of pus was found in the urine, but this gradually cleared up.

Before operation the patient had three attacks of acute pain in the right side, which were probably due to an inflamed appendix, although it is possible that they were caused by the infection in the kidney and the ureter.

In addition to these two cases, a number of instances of urinary incontinence have been treated, especially among young girls, in which we were not able to determine the etiology. In some the condition was probably due to a low-grade inflammation of the bladder, to an obscure nervous disorder, or to a relaxed bladder sphincter, which is very uncommon among young unmarried women. It is also possible that in some instances the incontinence was due to a ureter with an extravesical outlet, although it was impossible to locate the opening at the time of the examination. In our examinations, in order to locate the abnormal opening we have employed methods very similar to those described by Furniss.

The suggestion of a single ureter is substantiated by a cystoscopic examination, which shows the absence of the other. In our case, the ureter was located very close to the bladder sphincter, but it could be seen distinctly. Even if there is a supernumerary ureter, the cystoscopic examination may reveal a normal bladder with normal meatuses and normally functionating kidneys, as in one of our cases. If an extravesical opening is suspected and cannot be located, we have found it helpful to place pledgets of cotton in the vagina and urethra and over the meatus of the urethra, and to inject subcutaneously and intravenously some

sort of dye which colors the urine as it is eliminated. If the extravesical opening does not discharge continuously it may be necessary to repeat the procedure several times.

Treatment consists of implanting the truant ureter into the bladder. This has been done in several ways, most often, I think, by vaginal operation. In some instances a small sac has been found at the lower end of the ureter, and has caused some difficulty in performing the operation.

In the case of supernumerary ureter herein described, Dr. W. H. Maxon, of Oakland, Calif., performed a vaginal operation. The ureter had been freed in the vagina, an opening made in the bladder over a sound, and the ureter drawn into it. The operation had completely relieved the patient, and undoubtedly she would have remained well if changes had not been produced by pregnancies some years later. The stretching of the tissues had altered conditions so that at the time of our examination it was to determine the area of implantation. We felt sure that this ureter had been closed continuously for long periods at a time; and, as it would be very difficult to reimplant it on account of the scar, the supernumerary was ligated with a satisfactory result.

Under ordinary circumstances, however, it is my opinion that the procedure of choice is the abdominal extraperitoneal implantation of the abnormal ureter. This was done very satisfactorily in our second case in spite of the fact that there was considerable infection in the ureter. The technic of the abdominal operation is more accurate, and the implantation can be made with a better chance of preserving the lumen of the ureter and therefore the function of the kidney. That ureters transplanted in this manner will continue to functionate and maintain a normal kidney-function over a number of years, we have sufficient evidence.

We have recently examined two cases in which the ureter had been transplanted four years ago, and in each instance the adjoining kidney was practically normal.

In our two cases under discussion, the incontinence was relieved immediately, and relief has been permanent.

CASE A 163,923.—Marie L., female, single, aged 21, first consulted us on June 27, 1916.

Menstrual history, normal. She complained of diurnal enuresis, which had troubled her all her life. She had nocturnal enuresis when she was younger, but not recently. She complained of constipation, and said that when her bowels moved freely or following physic she had very little or no trouble.

Dribbling of urine was not constant. Strain or excitement caused urine to escape. Previous to one year ago she had three attacks of sharp, colicky pain in the right side of the abdomen, each of them lasting from one to two days. The attacks of pain were followed by soreness, and she was told by the physician who saw her in the attacks that they were due to appendicitis.

Repeated examinations of the urine showed considerable pus, and examination with the cystoscope showed some inflammation in areas at the left base. The ureteral meatus on the right side could not be found. The left meatus, situated just inside the internal sphincter muscle on the left side, appeared entirely normal, and clear urine was seen coming from it. The bladder sphincter appeared to be relaxed, and it was thought that this might account for the incontinence. (Figs. 1 and 2.)

Operation.—The sphincter was tightened by folding it upon itself and by taking a few stitches, but did not relieve the symptoms. Ten months later the patient returned for an examination, at which time her history was typical of extravesical ureter. She had incontinence and dribbling of urine, and in addition voided normally from three to five times daily. It was necessary for her to wear a pad constantly.

Cystoscopic examination at this time showed a left ureteral meatus situated just inside the bladder sphincter. On withdrawing the scope, a meatus was found in the right wall of the urethra 1.5 cm. outside the bladder sphincter. It had the appearance of a normal meatus. The right ureter was normal in length.

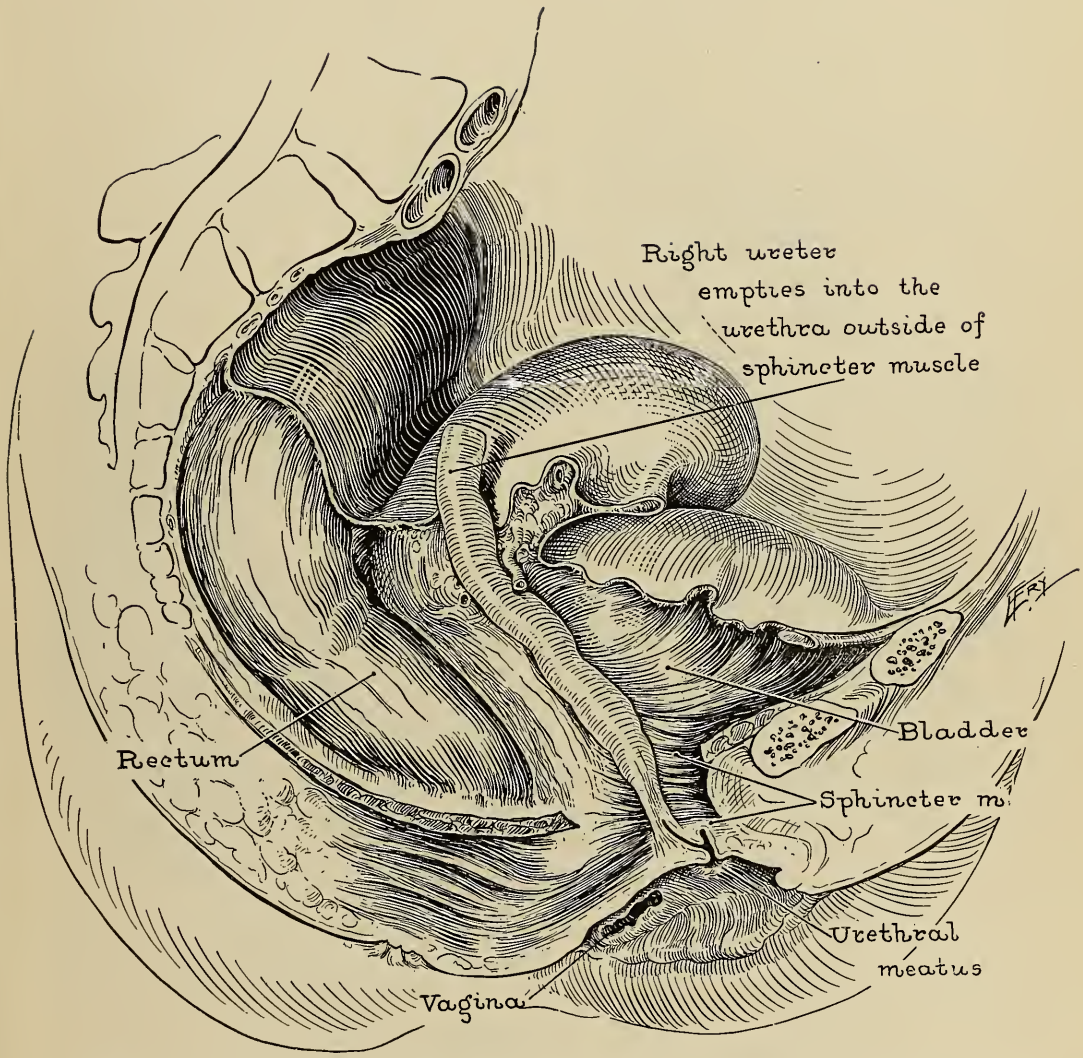

Fig. 1 (A163923). The single ureter on the right side was markedly dilated and had a thickened wall. This ureter opened into the urethra posteriorly one and one-half centimeters below the sphincter muscle.

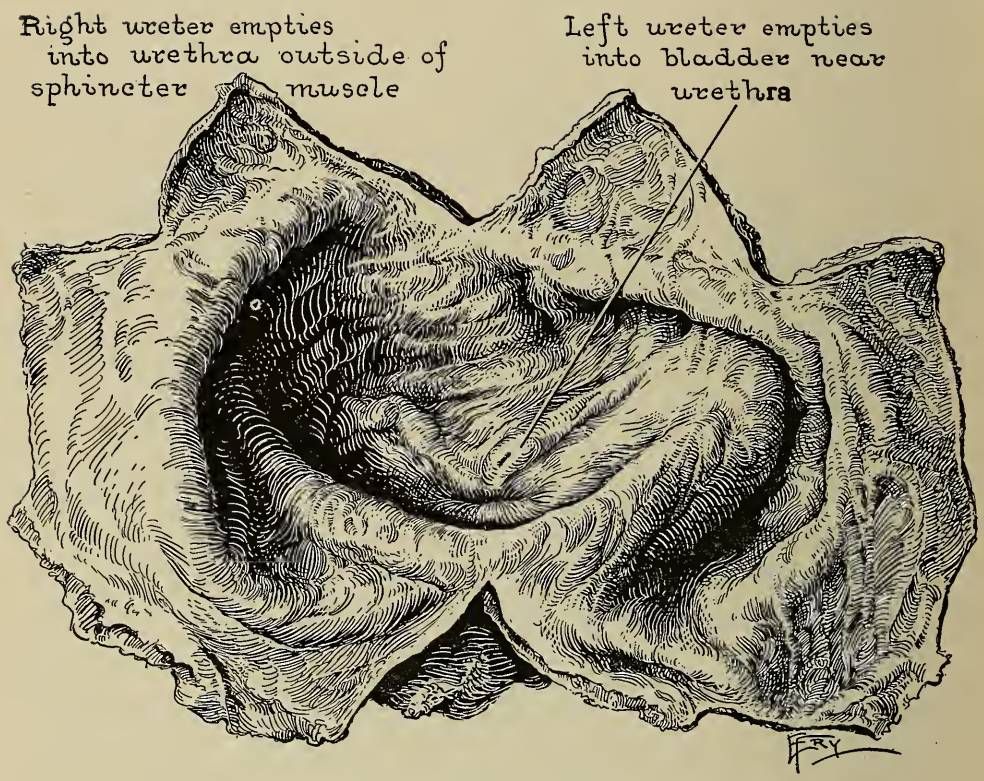

Fig. 2 (A 163923). Probable appearance of a bladder having only one ureteral meatus near the median line and just above the urethral sphincter.

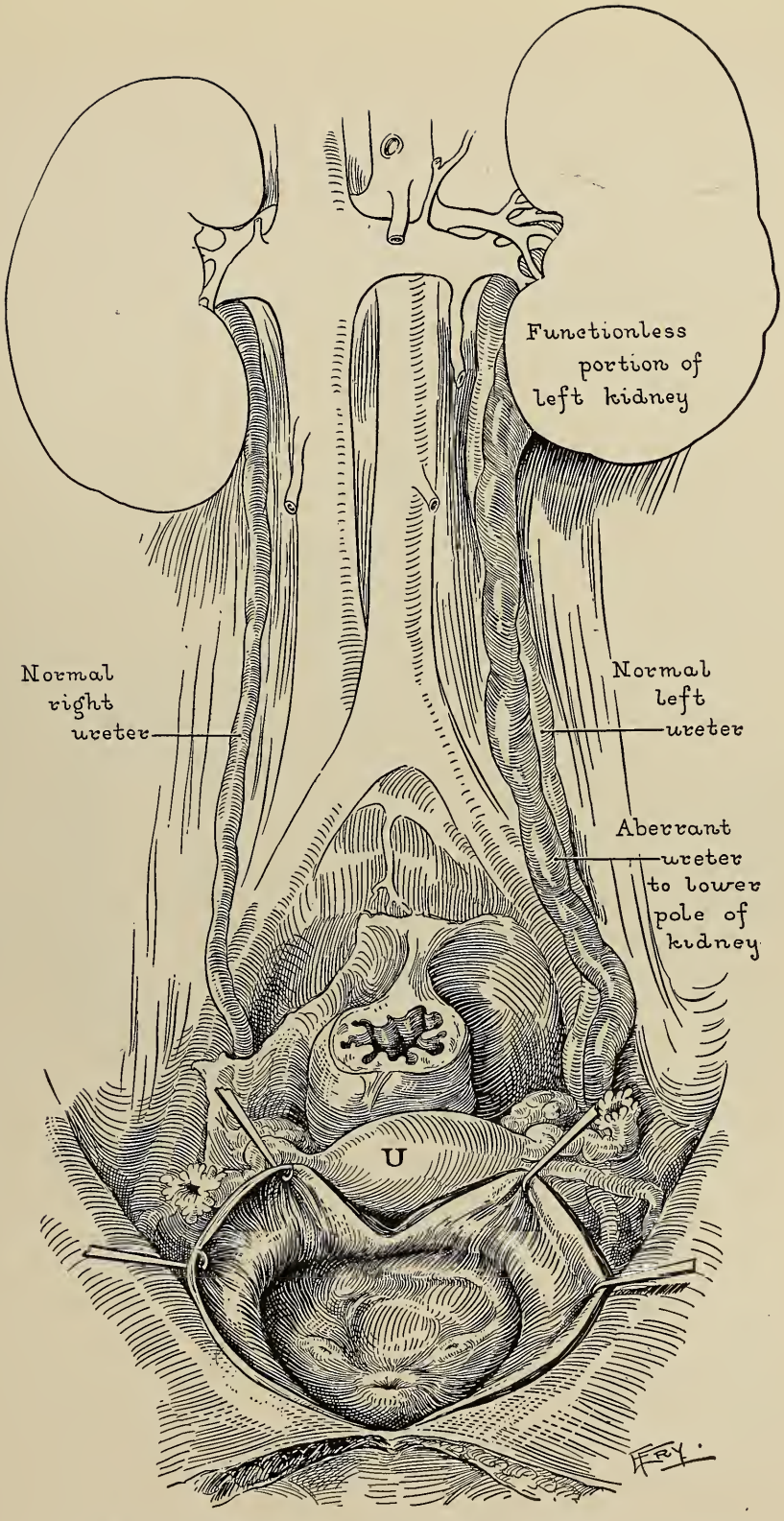

Fig. 3 (A 177181). Normal bladder with two ureters and meatus on the left side. The aberrant ureter crosses the normal one at two distinct points. The supernumerary ureter probably drains the upper segment of the kidney.

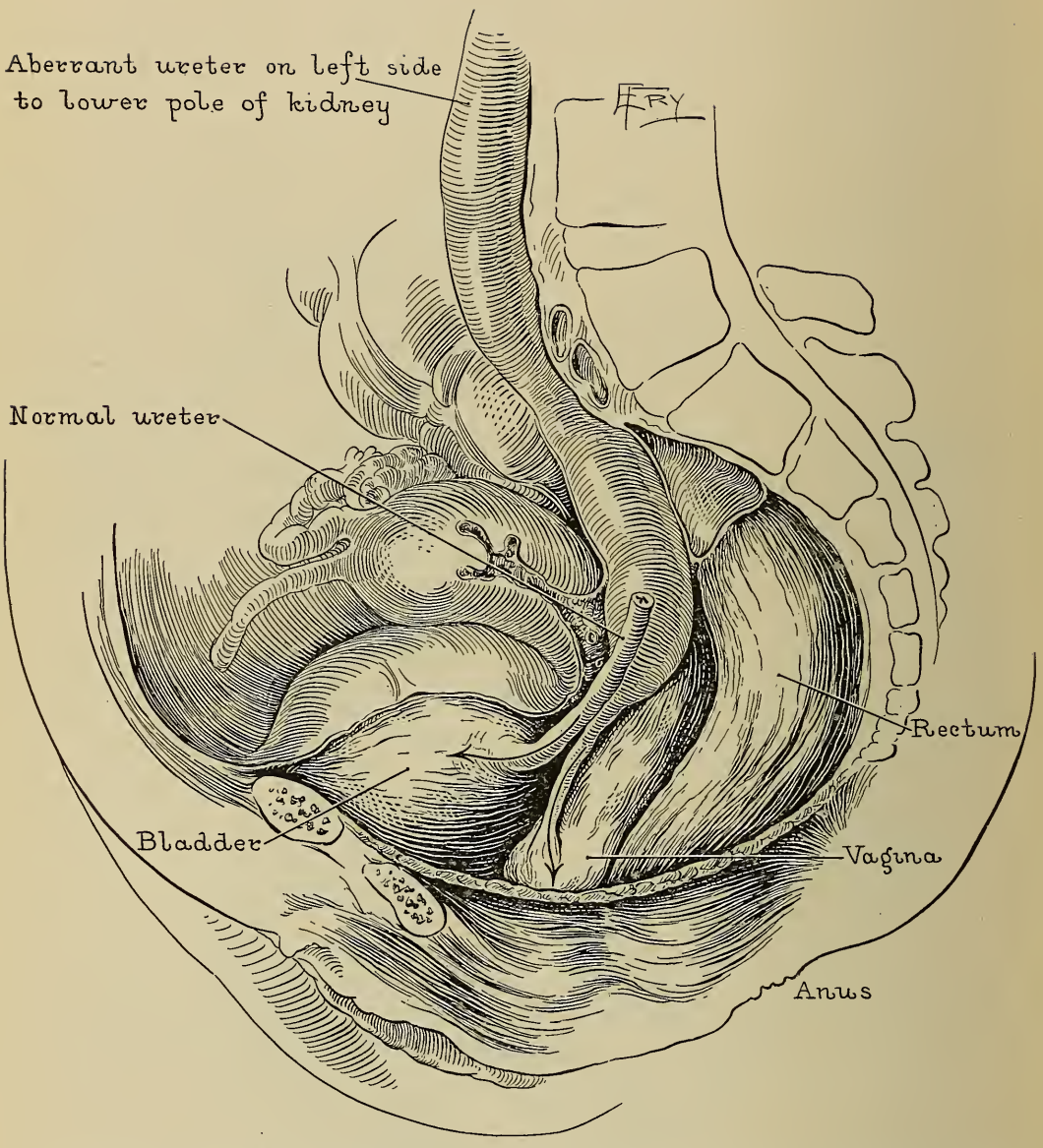

Fig. 4 (A 177181). The lower ends of the normal and supernumerary ureters. The supernumerary ureter was normal in its diameter for one and one-half inches, where it became markedly dilated as far as could be determined.

The right ureter was exposed through a right rectus extraperitoneal incision. The ureter was greatly dilated and thickened. It was surprising to find such marked infection in the wall of the ureter, which, of course, was positive indication that the kidney was infected. However, we decided to implant the ureter, and, if necessary, perform a nephrectomy later. A few days after the operation the patient had considerable pain in the region of the right kidney, and there was pus in the urine. Two ureteral catheters were readily passed into the pelvis of the kidney, and continuous pelvic lavage was instituted. From this time on the pain decreased. The wound healed promptly, although there was slight urinary drainage from it for a few days.

The incontinence ceased following this operation, and she has had no further trouble of that nature, although at times there is evidence of pylonephritis, such as pain in her side and an occasional slight chill. Repeated cystoscopic examinations have been made, and the kidney pelvis has been irrigated. At the present time, eighteen months after operation, the patient is practically free from symptoms, and probably will not require nephrectomy. The functional capacity of this kidney is only about half that of the one on the left side.

Case A, 177,181.—Mrs. J. T. R., aged 48; married seventeen years; has two children, aged 16 and 13, respectively; menopause three years ago.

She came for examination because of urinary drainage from the vagina. From birth she had had partial incontinence of urine. At eighteen years of age she was operated on by Dr. W. H. Maxon, of Oakland, Calif., for this trouble. Dr. Maxon writes that the operation was for congenital truant ureter. The right ureter passed just under the anterior vaginal membrane, but had no connection with the bladder, and came out very near, but not in common with, the lateral meatus of the urethra at the time of operation. The patient was dribbling about half of her urine at that time. Dr. Maxon dissected the ureter from the external opening for about two and one-half inches up the anterior vaginal wall. He then cut away about two inches of the ureter, passed a sound into the bladder, and made an opening in the bladder about where the ureter would normally enter. After placing one stitch in the lower end of the ureter he pulled it fully a half inch into the opening made in the bladder, and sutured it there. In a few days the redundant portion of the ureter came away, and an uneventful recovery followed.

This operation was performed twenty-two years ago, and the patient was entirely relieved until her first pregnancy. At about the fourth or fifth month of pregnancy incontinence returned, but was not so constant, except when she was on her feet. During her second pregnancy she had a greater degree of incontinence. When she was first examined at the Clinic the trouble varied. It was worse at times, but she has some incontinence most of the time.

On several examinations of the urine small amounts of pus were found. Cystoscopic examination was negative. Both ureteral meatuses appeared normal, and the individual phenosulphonephthalein output was normal. There was no evidence of the supernumerary ureter in the bladder. There was unquestionably some escape of urine into the vagina, although it was difficult to determine where it was coming from.

Operation.—A small incision into the scar of the former operation led into a little pocket, which seemed to contain urine, but it was impossible to pass a probe through this pocket into the bladder. The probe could be passed only about one-half inch. The sac was stitched over, and apparently the condition was relieved; however, relief was only temporary, and in a few weeks there was a greater amount of drainage than previously.

Several months later we succeeded in passing a probe into this pouch for several inches, but it did not pass into the bladder. We again dissected out the fistulous tract, and found that it led to a supernumerary ureter, which was strictured about two inches from the opening. There was some dilatation above this point, and there was a great deal of scar tissue, due to the former operations. The ureter had unquestionably been closed before for long periods of time, and it was probable that the adjoining kidney-tissue was destroyed. It seemed safe to ligate the ureter, and this was done with complete and permanent cure of the incontinence.

After the operation the patient had some increase in temperature, which lasted for several days, but there was little or no pain in the kidney region and no other evidence of trouble from the ligation of the ureter.

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DISCUSSION

Dr. J. P. Henderson (Kansas City, Mo.): These cases, as all cases of rupture of the bladder, should be reported, and I wish to report, briefly, one case of supernumerary ureter in a woman, twenty-two years of age. This ureter emptied into the vestibule of the vagina. By giving the indigocarmine test, and by cystoscopic examination, it was found she had two ureteral openings in the bladder that were normal in appearance, but one abnormal in location,—one on the left side near the internal meatus. The other one on the right side normal. Then one emptied below into the vestibule of the vagina. The indigocarmine and collargol tests showed a round opening just posterior to the bladder. This ureter did not empty into the bladder. I examined the inside of the bladder while I took this picture. No collargol went into the bladder at all. I thought I could get rid of this by operation per vaginam, but I could not. Knowing there were two normal ureters that emptied into the bladder, and that the kidneys were functioning properly, I went in above and tied off the supernumerary ureter. I saw the patient two or three years ago, and the result has been very satisfactory.

GUNSHOT FRACTURES OF THE SHAFT OF THE HUMERUS

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Since nearly every case of gunshot fracture of the bones of the extremities is compound and infected, there arises in practically every instance the important question of whether or not one should strive in the presence of infection, perhaps taking the form of active phlegmon, to secure coaptation and provide extension.

Four measures, as stated by Rydigier, are of indisputable value: (1) reposition, brought about in the most gentle and cautious manner; (2) the most precise and uninterrupted immobilization not disturbed during the change of dressings; (3) a supportive apparatus, allowing free access to the wound; (4) a supportive apparatus, the making and use of which requires the least technical skill and experience.

It is established that many gunshot wounds of the soft parts, even in soldiers coming from the necessarily insanitary trenches, heal by first intention, as Simon and Pirogoff have stated. In the case of gunshot wounds of osseous tissues, however, a stage of infection with suppuration, while not fairly to be recognized as an obligate stadium, as Strohmeyer contends, is certainly present in an overwhelming majority of instances. For example, in our gunshot fracture material, embracing more than five hundred cases,

we operated in less than a dozen which healed by first intention.

In gunshot fractures of the humerus with active infection and with extensive swelling and great tenderness, the obstacles in the way of securing good immobilization and extension are sometimes insurmountable, so that the surgeon must be content, first, to treat the infection without regard for the unfavorable position of the fragments. Nearly always, however, immobilization is possible, and likewise extension may be provided, even if it be in so simple a form as gravity extension brought about by the downward pull of the heavy swollen member lying on a simple internal splint.

Von Eiselsberg, Rydigier, von Haberer, Burian, and many others have spoken of the desirability and need of greater attention to the position of bone fragments in the presence of infection. Perthes, on the other hand, in speaking of badly infected femur fractures, advises against measures aimed at reposition until acute infection has subsided. This, however, as Rydigier observes, should apply only to radical or forcible means to secure coaptation and extension. There is little or no difference of opinion as to the advisability of providing rest and extension, if thereby nothing is done which interferes with the proper treatment of the phlegmon.

In the correct position of the bone fragments, drainage is better than when the bone ends lie in abnormal relation in lacerated muscle tissue (Rydigier), and the reposition of fragments is easier before extensive scar formation has shortened and hardened the soft parts.

In a large number of gunshot humerus fractures it has seemed inadvisable, because of severe pain and swelling, to apply any extension device which could in any way cause circular constriction of the arm. Thus, weights hanging by bandages from the flexure

of the elbow, or any extension apparatus causing pressure over the infected swollen area or near it, were, as is perhaps quite obvious, found to be impracticable.

The weight of the dependent heavy swollen arm itself often operates to excellent advantage in securing a moderate degree of extension. With the added weight of a plaster cast, a Toephfer or Kramer woven-wire splint, or the much superior open heavy-wire splint of Jones, Eiselberg, or Engleman, the last three allowing free access to the wound, there develops traction from the gravity pull alone.

In the use of the Middeldorpf triangle an excellent splint is provided for the support of the humerus fragments, and for their retention in alignment, while the weight of the swollen arm furnishes some downward traction.

While the abducting splint of Hoffmann and its various modifications provide comfortable support for the fractured arm, they do not allow of gravity extension, as does the Middeldorpf triangle.

Splints like that of Hoffmann, which hold the humerus in abduction at or near a right angle with the spine, are of greatest service in the case of gunshot fractures of the upper end of the humerus shaft, owing to the possibility of stiffness or ankylosis of the shoulder-joint. In such a case the upper arm is, with prudence, fixed in marked abduction for the reason that, should stiffness or ankylosis supervene, the mobility of the entire upper extremity will be dependent on the mobility of the scapula alone; and the arc of mobility of the ankylosed shoulder is greatest if the fixation has occurred with the humerus in abduction, so that, when the arm hangs at the side, the tip of the scapula approaches as nearly the midline of the back as possible (Wullstein-Wilms).

In gunshot fractures of the upper humerus without great swelling of the soft parts, strong traction may

be secured by using the wire splint of Jones, or the wooden modification of it. Here extension is maintained by a broad bandage, or cravat, across the upper forearm at the flexure of the elbow, and counterextension is provided by the axillary post of the splint. Elastic pull is furnished by a rubber band or spiral spring interposed in the cravat at the attachment below.

In fractures with wounds on the inner side of the arm the device of Burian may be utilized for immobilization and extension. Two cravats, one in the axilla and the other at the elbow, both attached to cords passing over pulleys, receive elastic traction from a spiral spring at the back of the splint.

More important than any splint or cast for the treatment of gunshot fractures of the humerus is the principle that each case requires individual consideration—that no device is suitable for all cases. For example, in fractures suitable for the Hoffmann splint, it may be impossible to immobilize the arm with comfort in abduction at right angles to the spine, in which instance resort may be had to a simple modification of the Hoffmann splint which allows any degree of abduction. The post supporting the upper arm-rest moves on a ratchet on the base lying against the thorax. Thus the degree of abduction may be changed at will without disturbance of the dressings.

Not many patients with gunshot fractures of the upper arm will find adhesive plaster or mastesol and weight-extension comfortable owing to the tenderness and pain of the infection. To most of the soldiers thus wounded, we have found such extension methods intolerable. In a few instances in which swelling and tenderness were not marked, masteol extension has been well borne, especially when the extension was combined with rest in bed. In general, however, it may be said that a traction splint like the wire splint of

Jones, permitting as it does traction of all fragments in all directions and allowing free access to wounds wherever situated and not confining the patient to bed, is greatly superior to adhesive-strap extension.

In treating the infection of gunshot humerus fractures in addition to immobilization, removal of infected bits of clothing, incision, and drainage, it will not infrequently be desirable to employ hot wet antiseptic dressings. The Jones splint permits the application of hot fomentations to any part of the arm.

For the hot, wet dressings, Dakin's neutral solution of chlorinated soda has proved of great merit. It is cheap (a very important matter in war surgery) and is highly bactericidal. Bedridden humerus fracture cases, that is, those with extensive infections, may be treated by continuous through-and-through irrigation, as are the infections of the lower extremity. Thus, in deep and extensive infections of the arm, a rubber tube is inserted to the bottom of the wound or entirely through the member, and the solution is allowed to flow into or through the wound by the drop method, or retained in the wound by the punched tubes suggested by Carrel.

Excellent results have been attained in fractures of the lower end of the humerus with shattering of the elbow by placing the arm in a continuous hot bath of neutral solution of chlorinated soda.

Solution of aluminum acetate (Burow's solution) is likewise useful for the continuous bath in infections.

Ambulant patients have large hot wet dressings of neutral solution of chlorinated soda applied around the drainage tube and over the open wound. The dressings are changed at frequent intervals.

The open method of treating fracture wounds recommended by Braun, Lörcher, and Walzel has proved to be a valuable resource, obviating, as it does, the frequent painful changing of dressings with destruc-

tion of granulations, and minimizing foreign-body reaction. In favorable weather infected gunshot wounds are exposed to the sun's rays for several hours daily. The solar rays without doubt hasten the drying up of secretions and stimulate epithelial growth in many cases. Pyogenic bacteria and contaminating saprophytes succumb rapidly in the sunlight.

With subsidence of infection after all signs of inflammation have passed, gunshot fractures of the humerus may be treated safely by the more forcible methods of extension,—for example, with the bridged plaster-of-Paris cast of Rydigier, in which two segments of plaster, the one encasing the shoulder, the other the elbow, are held apart by an iron brace. The iron bridge is bent at right angles above and below, and the ends are incorporated in the two plaster segments. A screw like that used to render wire taut is set in the brace, and extension is developed by forcible separation of the two segments of plaster cast. Obviously, forcible extension may also be secured with the Jones wire splint or any one of its modifications.

Unfortunately, shortening of the soft parts and scar formation, as well as callus, militate strongly against the success of extension methods if these are not applied early; hence the reasonableness of beginning extension as early as possible in all infected gunshot fractures of long bones.

In the cases of severe infection demanding postponement of all efforts to correct deformity until fixation of the fragments in faulty position has become so firm as to exclude extension treatment, resort must be had to open operation as the only means of restoring normal anatomic relations and functions. The Lane plate, wiring, bone-peg and dowel-graft methods are all useful in appropriate cases. We have used the Lane plate in cases in which tendency to angulation was such that it was feared the dowel graft or intra-

medullary bone-peg might break. Wiring was employed in long oblique fractures, and intramedullary autogenous bone grafts were used in all cases in which the shape and position of the fragments were such as to admit of their use, that is, when the medullary canal was well preserved in the ends of both fragments. Intramedullary grafts were preferred to dowel grafts because of the greater strength of the former.

The Lane plate was used, for example, to unite the pointed ends of fragments which it would have been difficult to unite directly by bone-grafting. An advantage of the Lane plate is based on the circumstance that apparently cured infections often reappear after bone-plastic operations. The reawakening of dormant infection is a recognized and not infrequent sequel of operation in gunshot fractures. The Lane plate, if it must be removed because of the reappearance of infection, can be taken out easily, certainly much more easily than an intramedullary bone-peg.

In view of the fact, noted by all surgeons of experience in the operative treatment of gunshot fractures, that infections apparently entirely healed for many weeks will reappear as the result of trauma, hemorrhage, etc., incident to operation, no open operation for the correction of deformity due to gunshot fracture should be undertaken until several months have elapsed after the disappearance of every sign of infection.

As an evidence of the respect in which the many surgeons hold this late infection, or their dread of it, mention may be made of a proposal that, after healing of infected fractures with bad deformity, no attempt should be made in many instances to operate at the site of fracture, but as remote from it as possible. For example, after healing of an infected fracture of the upper third of the femur or humerus with decided angulation, the bone should be divided at a lower level, compensation made for the angulation above, and the

bone elongated as tendons are lengthened, by splitting the bone longitudinally with a circular motor saw and cutting out laterally above to the right and below to the left, sliding the sawed surfaces along each other until the proper degree of elongation is secured.

It need hardly be said that infected gunshot fractures do not tolerate open operative interference. Practically all gunshot fractures are infected; therefore the field of operative surgery in war fractures is relatively small. In the stage of acute infection no such operative step as the laying on of a Lane plate could be considered, except perhaps in the extremely rare instance in which the application of the plate or other metal support is made through large lacerations of the soft tissues, with the idea of holding fragments temporarily and with the understanding that it must be removed later on. An occasional success with this plan by no means discredits the general statement that the practice is foolhardy. Even in the case of gunshot fracture of the lower jaw, experience in this war has proved that primary bone-suture or wiring is to no good purpose. It has been shown in these cases that primary bone-suture is rarely effective, that primary healing never occurs, and that suppuration and sequestrum-formation always follow. In other words, the primary bone-suture in jaw fractures does only harm and no good.

The experience in the present war has demonstrated that for weeks after apparently complete healing of gunshot wounds the infection lurks in bone and soft tissues about the site of fractures, making any open operative procedure a doubtful undertaking. Fractures plated two months after the disappearance of every discoverable vestige of infection or inflammation have reacted with what bore every evidence of a recrudescence of the old infection. The *x*-ray in these cases revealed no signs of inflammation and none were found during the operation itself. Instances of this

kind have been so numerous that some surgeons have advised against bone-grafting or plating in practically all healed gunshot fractures with deformity, suggesting, instead, simple osteotomy and subsequent intelligent and persistent employment of extension.

Osteotomy and extension are not only less likely to provoke the recrudescence of dormant infections, but very often this simple method meets every requirement in the way of providing accurate coaptation with good position. An illustrative case was one of our own in which a Lane plating was undertaken for the correction of the deformity of a healed femur-shaft fracture with extensive dislocation of the two fragments "ad axem ad latus et ad longitudinem." There had been no sign of infection for several weeks, the callus had hardened, and the case seemed suitable for a bone-plastic operation, and not one easily to be corrected by simple osteotomy with subsequent extension. During the course of the operation after the bone fragments had been dissected free, the condition of the patient suddenly became such that he had to be returned to bed without applying the Lane plate, as intended. Extension was employed, and at the end of six weeks the fragments had reunited in good position. Other similar instances have drawn attention to the somewhat unappreciated value of osteotomy and extension in healed fractures with bad position, suggesting that we had come to rely too much upon plate, grafts, etc., using open methods when quite unnecessary, and to some extent positively dangerous.

A gunshot fracture, healed but harboring a dormant infection, could hardly be subjected justly to open operation, especially a plastic operation, except upon the erroneous assumption that the infection had entirely disappeared. As it is almost impossible to learn, before or even during operation, of the presence of infection in healed cases, and inasmuch as the infection often persists for months with no manifestations

whatever, it follows that open operations in healed gunshot fractures should not be undertaken without a due sense of the dangers of lurking infection. The extra manipulation required to complete a bone-plastic operation with a plate and the presence of the foreign body, without much doubt, stirred up latent infections in several of our cases. Fortunately, removal of the plate with subsequent continuous irrigation with Dakin's solution, and extension, sufficed to control the infection, which was from the very beginning of its flareup in an attenuated form, the discharge being made up largely of lymph and containing relatively few pyogenic bacteria and pus cells. Such experiences teach a lesson which, although in a sense generally understood, is perhaps not sufficiently appreciated,—that is, that open operation in gunshot fractures of the long bones is not indicated before two months, at the very least, have elapsed after the disappearance of every sign of infection, and then should take the simplest form possible under the circumstances, which means osteotomy and extension, in a large percentage of cases. In so far as efficient extension, even when begun many weeks after the receipt of gunshot fractures, results in a gratifying proportion of cases in complete cure without deformity, it is clear that open operation cannot be undertaken with good reason except when extension has failed after intelligent trial and after signs of infection have been absent for months. If simple osteotomy with extension suffices to bring and hold the bone fragments in good position, no one with any experience in treating war fractures would inflict upon the parts the extra manipulation or trauma by instruments which the use of a plate entails. So that even in cases which before incision have been prepared for a graft or plate, if, after osteotomy is done, extension corrects the deformity, then prudence and common sense demand that the operation end there.

SUTURELESS SKIN-SLIDING METHOD FOR THE RADICAL TREATMENT OF LUNG ABSCESS AND CHRONIC OSTEOMYELITIS

Specially Adapted to War Wounds

Emil G. Beck, M.D., F.A.C.S.

Chicago, Illinois

The present war has produced a tremendous increase in the number of chronic suppurations. The hospitals of Europe are overcrowded with just such cases, and no doubt before long we too shall have thousands of these chronic suppurative cases to treat. It is, therefore, imperative and timely to discuss the treatment of chronic suppurations of bones and joints and the chest cavity.

I desire to bring before the profession some new suggestions for the treatment of this protracted type of suppuration. These suggestions are based on an experience gained in treating several thousand cases of chronic suppuration. Although most of the cases treated were not due to injury, but originated from infectious diseases, the late conditions in both instances are so similar that I believe the treatment here outlined will be just as effective in war injuries.

Nearly all of the war wounds are infected from the very moment the missile penetrates the tissues. Infection is carried into the wound by fragments of clothing or the trench dirt, which usually covers the

soldier's skin. It is fortunate that the field surgeons are now in a position to disinfect most of the wounds before the infection has spread and thus prevent many deaths, or the loathsome chronic pus-discharge.

The methods of this immediate sterilization of wounds, such as were introduced by Carrel and others, and likewise the total excision of the infected wounds as practiced by English surgeons, need only to be mentioned here, since my remarks will be confined to the treatment of the late cases, those in which the prophylactic method had already been employed but in spite of which the chronic suppuration had persisted.

Guillot and Woimant,[1] who recently published their experiences with infected fractures in the French base hospitals, state that probably 50 per cent of all fractures of the thigh still suppurate after ten months' treatment. Can any one of us realize what an amount of suffering this causes and what expense and labor are involved in dressing these wounds, aside from the economic loss caused by the incapacity of this vast number of men?

We shall divide the subject into two parts:

1. The treatment of chronic empyema and lung-abscess after prolonged suppuration.

2. The treatment of chronic suppuration resulting from bone-infection.

There is a vast amount of literature on each of these subjects. The evolution of methods of treatment, varying from decade to decade, is well known to surgeons, but the fact that thousands of cases remain uncured indicates that we have not yet perfected our methods. We still encounter chronic suppurative empyema and lung-abscesses, as well as sinuses from bones and joints, which have persisted for a quarter of a century, although they may have been operated on repeatedly by most competent surgeons.

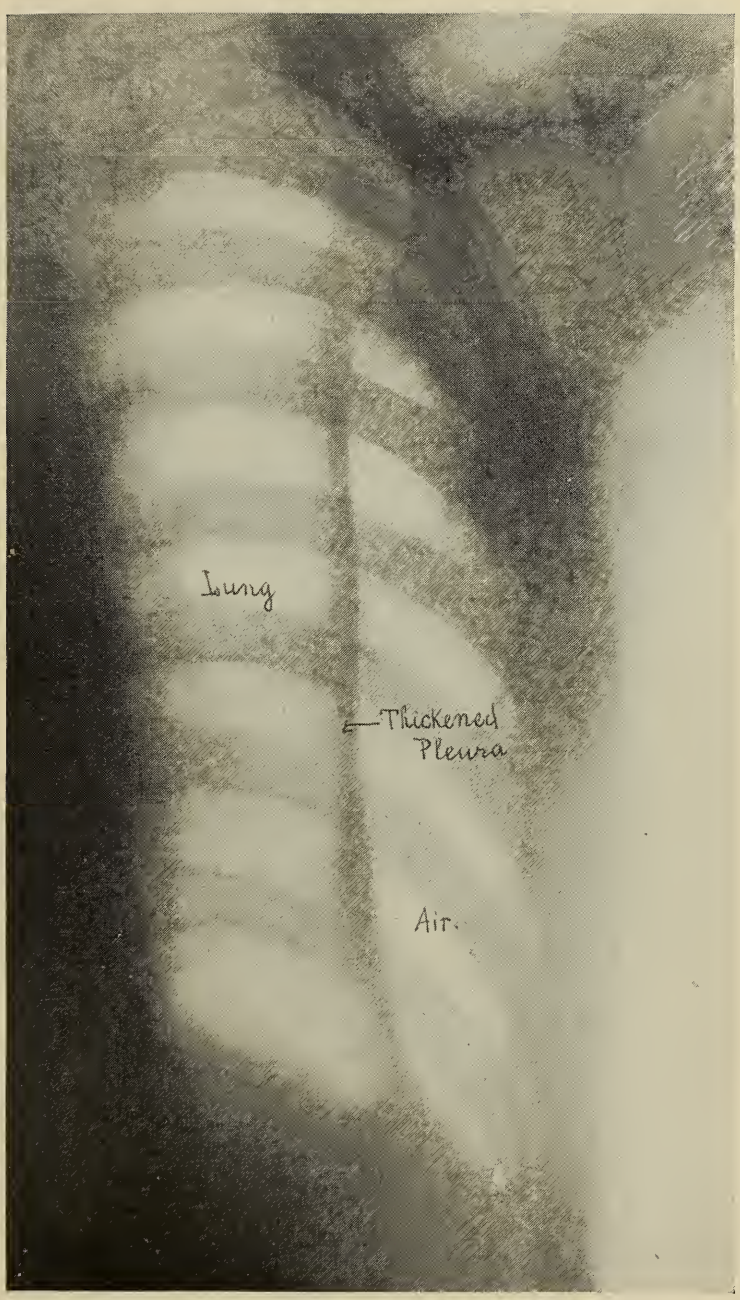

Fig. 1. Empyema showing thickened pleura dividing chest cavity; to the left the compressed lung, to the right the empyema cavity.

Fig. 2. Empyema (shown in Fig. 1) injected with bismuth paste. Note the thick pleura on margin of paste.

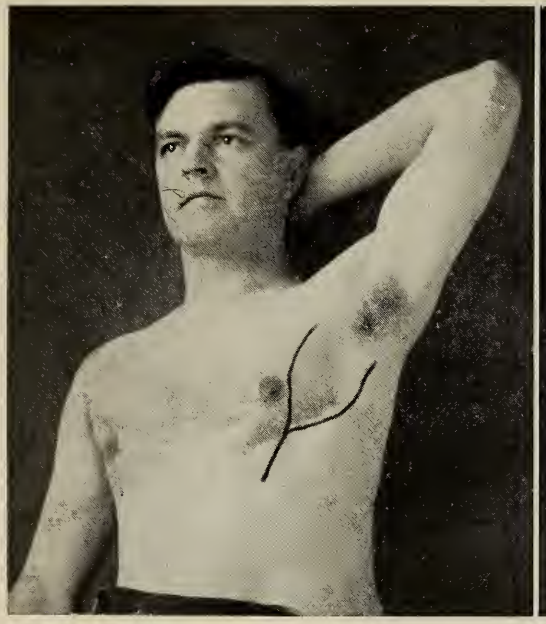

Fig. 3

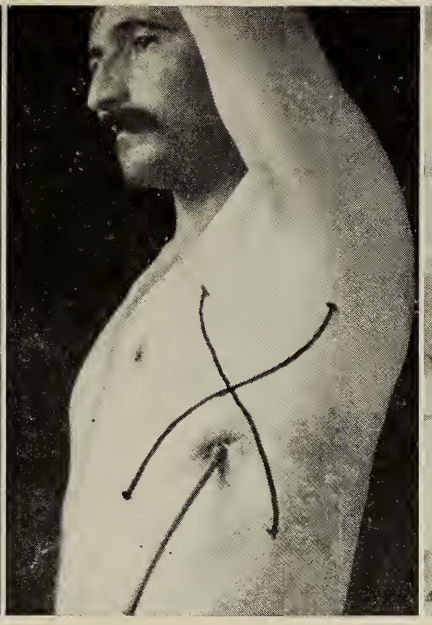

Fig. 5

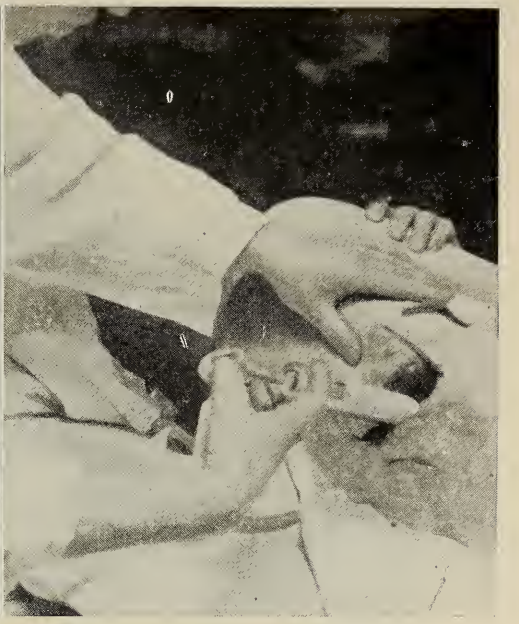

Fig. 4

Fig. 3. Y-shaped incision for empyema, cavity high.

Fig. 4. X-shaped flap incision for very large cavities.

Fig. 5. "Trap-door" incision for lung-abscess, when posterior.

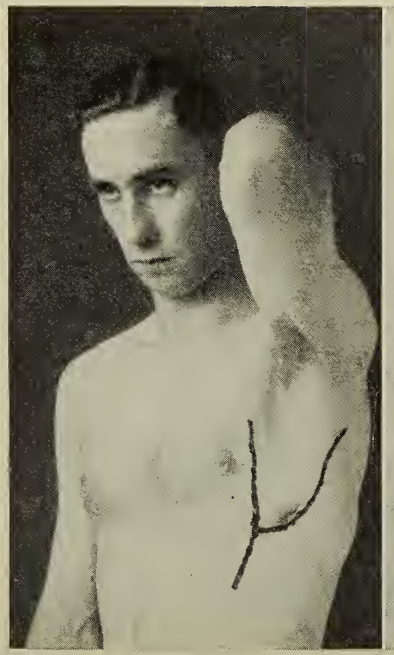

Fig. 6

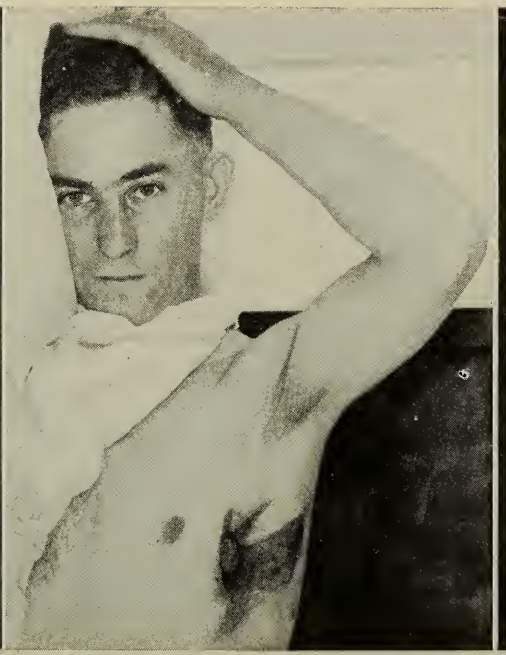

Fig. 7

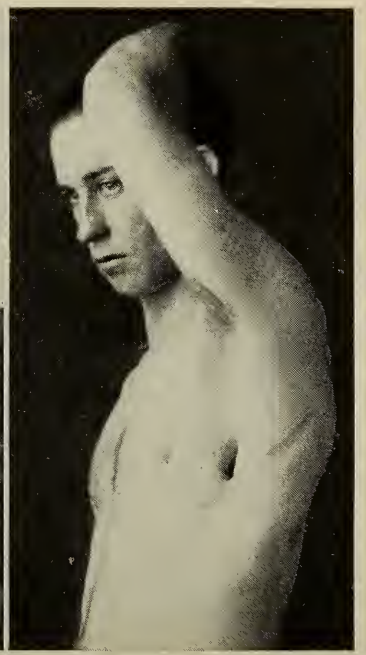

Fig. 8

Fig. 6. Outlining the flap incision for empyema.
Fig. 7. Skin flap implant into empyema, 2 weeks after operation showing width of denuded surface.

Fig. 8. Patient 8 weeks after operation, showing denuded surface covered with skin, pus discharge ceased. Gain 20 pounds.

Fig. 9. Röntgenogram of empyema with rubber catheter, estimating the size of the cavity. Wire localizer estimates distance of abscess from the skin.

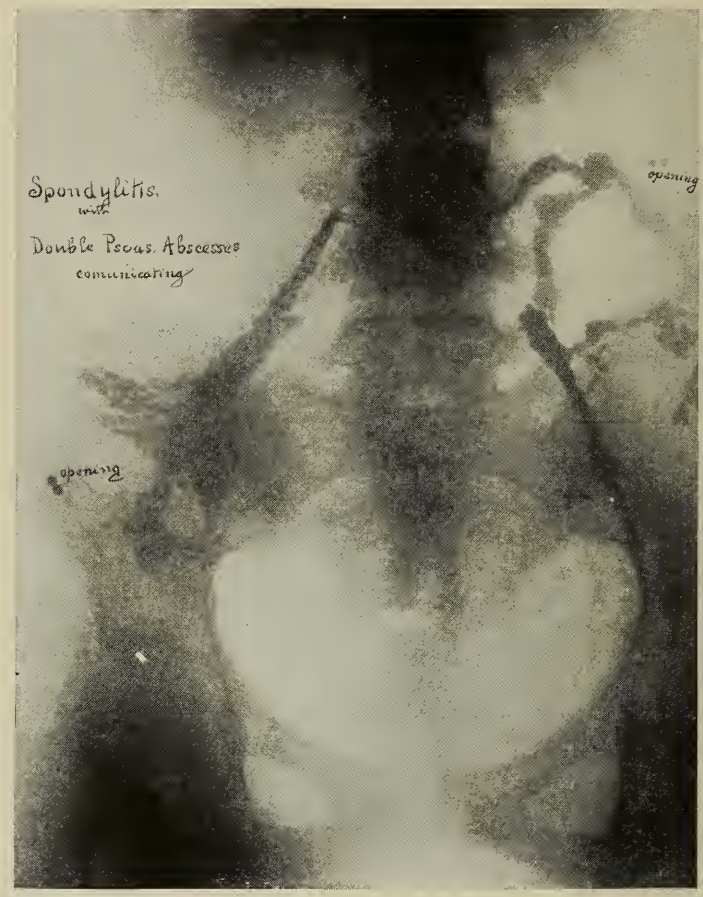

Fig. 10. Röntgenogram showing injected sinuses and illustrating the fallacy of probing the same.

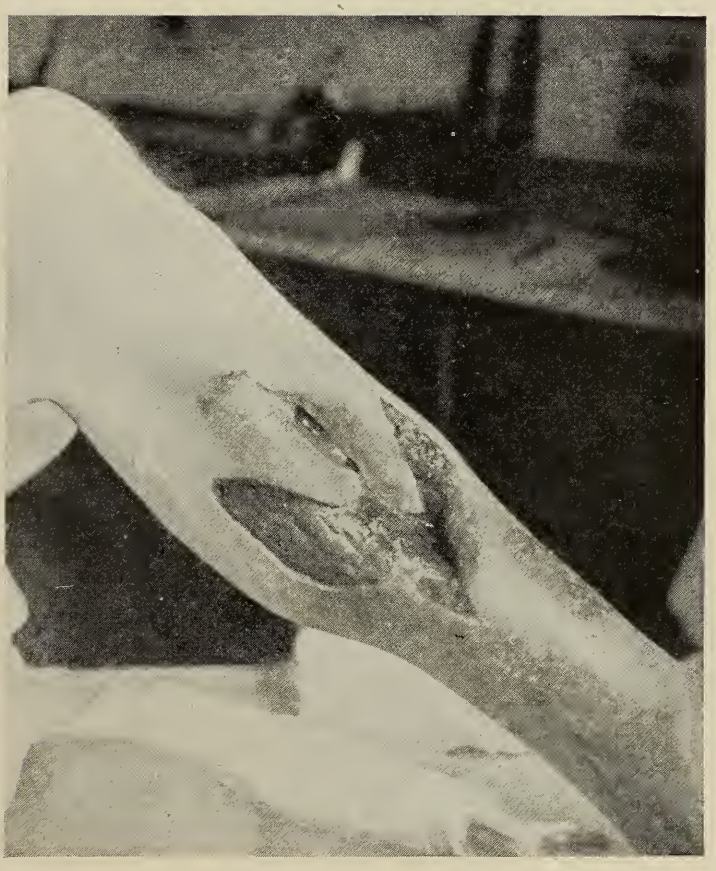

Fig. 11. Three skin flaps implanted into tibia, 6 days after operation.

Fig. 12

Fig. 12. Tuberculosis of os calcis. Discharging sinuses.

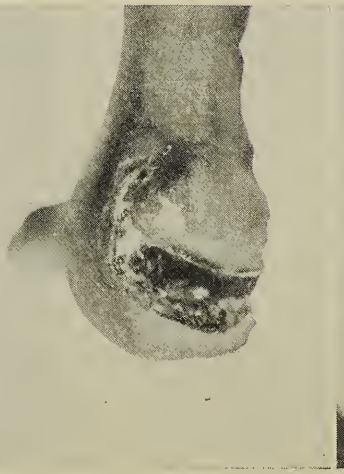

Fig. 13

Fig. 13. Implanted skin flap into cavity left after removal of the os calcis.

Fig. 14

Fig. 14. Complete closure of wound without suture, 5 weeks after operation. The foot has assumed nearly normal shape.

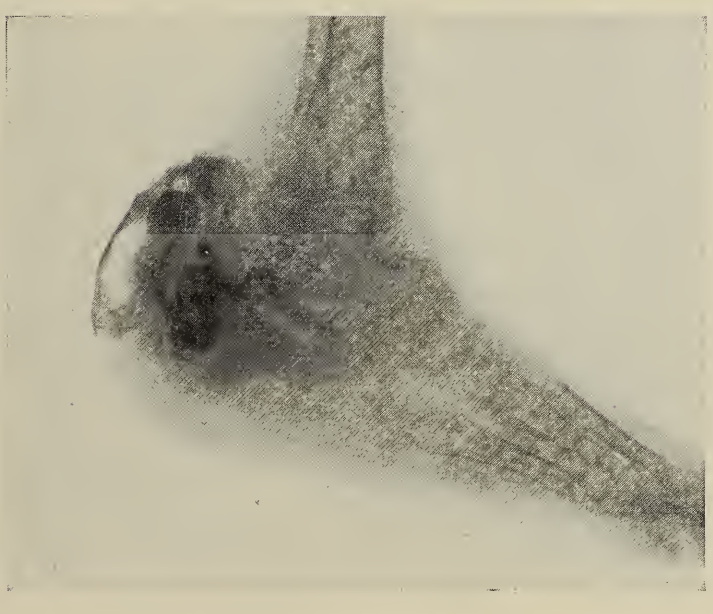

Fig. 15. Destruction of entire os calcis and two metatarsal bones.

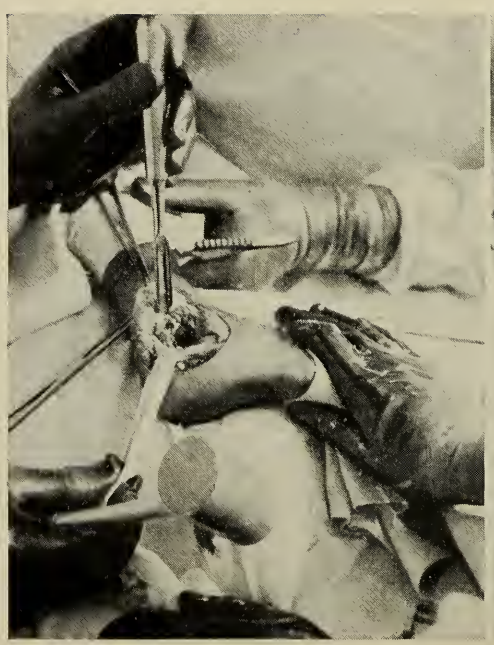

Fig. 16

Fig. 17

Fig. 18

Fig. 16. Removal of diseased metatarsal bones. Tendons held back by gauze strips.

Fig. 17. Implantation of skin flap into ankle-joint. Compression by packing gauze against it.

Fig. 18. Photograph showing final result. Flexion and extension were nearly normal. The child is able to walk with but a slight limp.

Fig. 19

Fig. 20

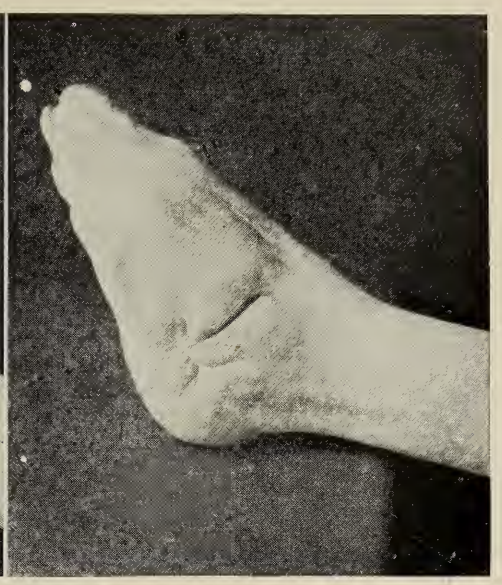

Fig. 21

Fig. 19. Tuberculosis of foot, showing extent of disease. All metatarsal bones destroyed.

Fig. 20. Result after excochleation of practically all metatarsal bones and part of os calcis.

Fig. 21. Showing final result after skin implant. Moderate extension and flexion. Three months after last operation. The patient can wear an ordinary stock shoe and walks without a crutch.

Fig. 22. Curettage without skin flap lower part of tibia. Eight years ago.

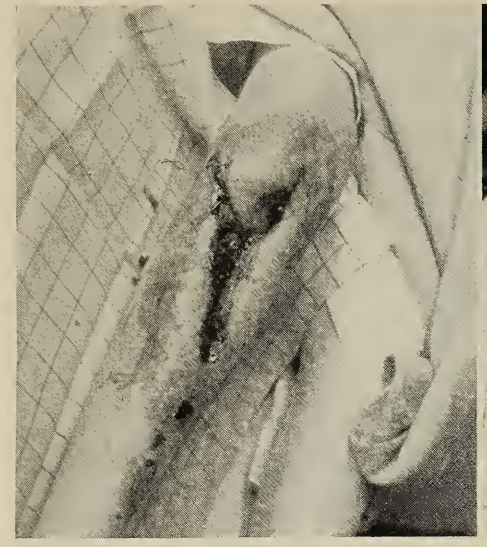

Fig. 23

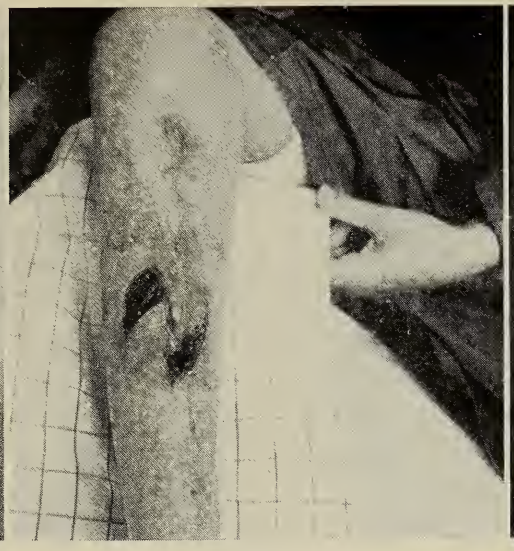

Fig. 24

Fig. 25

Fig. 23. Large skin implant in head of tibia. Healing took place rapidly. Note denuded surface. Two years ago.

Fig. 24. Note healed head of tibia and new skin implants into middle of tibia.

Fig. 25. Final result.

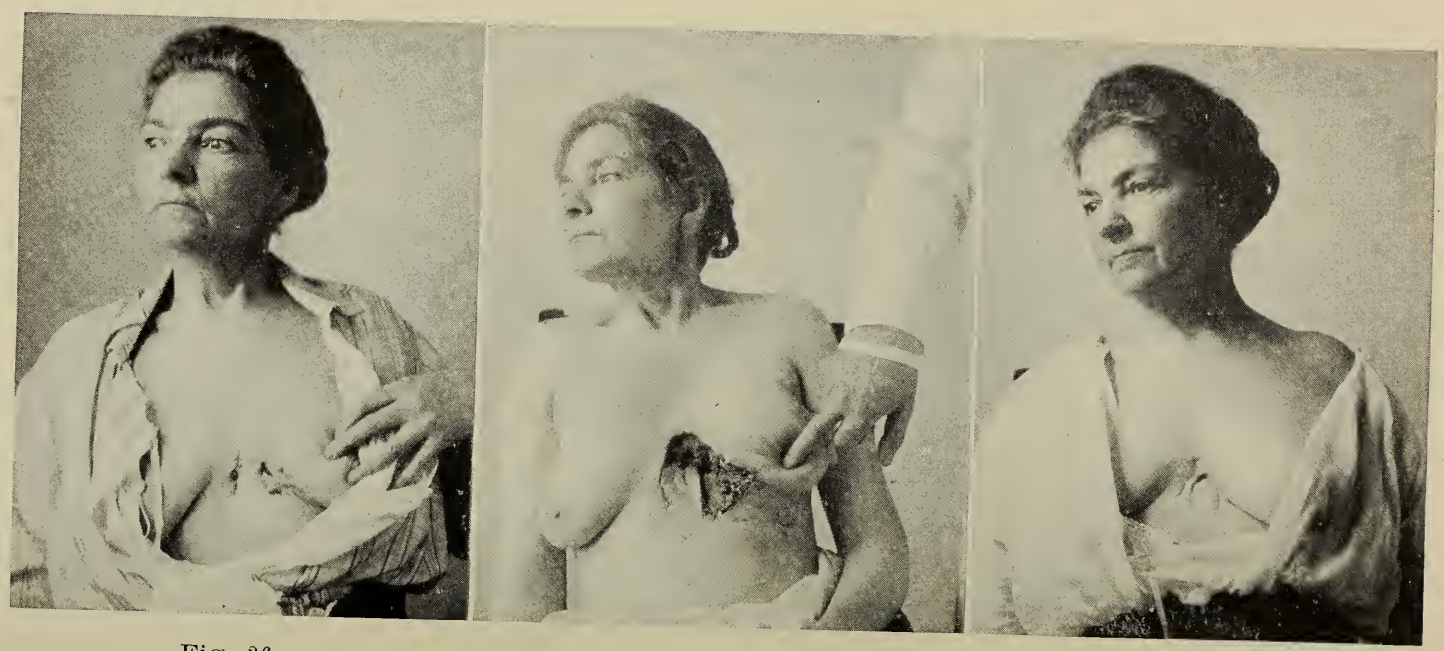

Fig. 26

Fig. 27

Fig. 28

Fig. 26. Four sinuses from tuberculosis of sternum, discharging fifteen years. After five operations.

Fig. 27. Skin-flap implant after removal of sternum.

Fig. 28. Final results, 6 weeks later. The sinuses closed and the denuded surface was obliterated. The patient gained 20 pounds.

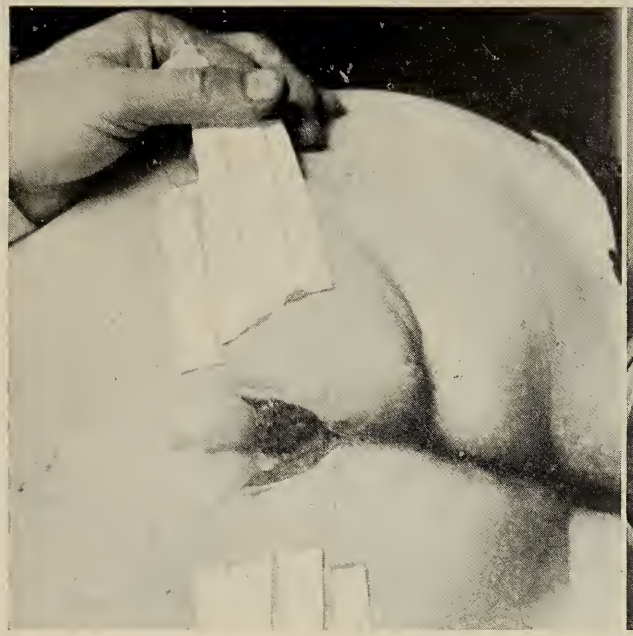

Fig. 29 (at left). Showing skin implant into depth of dermoid cyst.

Fig. 30. Final result. Depression completely lined with skin. Suppuration ceased.

Fig. 31

Fig. 32

Fig. 33

Fig. 31. Flap incision for the exposure of the femur.

Fig. 32. Wide exposure of diseased femur. Skin flap covered with warm salt gauze.

Fig. 33. Complete eradication of disease, leaving no groove in the bone.

Fig. 34

Fig. 35

Fig. 36

Fig. 34. Skin flap inserted into depth and anchored with tack to bone. No suture.

Fig. 35. Wound 2 weeks after operation, showing gradual epidermization of denuded surfaces.

Fig. 36. Photograph taken 8 weeks after operation showing complete closure and epidermization. The disease in the femur is entirely healed.

CHRONIC SUPPURATION OF THE LUNGS AND PLEURA

In order to arrive at a rational and consistent treatment, we must first ascertain in each case the etiology and pathology. The majority result from infectious diseases of the lung or pleura, pneumonia and tuberculosis being the most common. Other diseases furnish a minor percentage. Injury to the lung caused by stab or gunshot wounds, or crushing, in peace times produce only a small percentage of cases, but now in war times the traumatic type predominates.

A foreign body penetrating the chest nearly always carries with it some infectious material, and this produces a suppuration.

J. P. Simonds,[2] who has made an extensive study of the gas-bacillus infection, stated that the spores of the bacillus Welchii were found in 100 per cent of the uniforms of Belgian soldiers who had come directly from the trenches, and also in the meshes of the samples of the new cloth from which the uniforms were made. Of twenty fresh war wounds, fifteen were found to contain this group of bacteria.

Even if the wound is sterile, the injury to the lung and the accumulation of blood furnish a very favorable pabulum for subsequent infection and a consequent pyothorax.

At times a foreign body will remain in the lung for years without causing any symptoms, and then give rise to the most distressing condition, "a lung-abscess." The repeated puncture for a serous effusion, may change the sterile fluid into pus, and thus produce an empyema.

The diagnosis of empyema is a rather simple matter. It must be differentiated principally from a serous effusion and from a lung-abscess. A dullness of the chest which changes with the position of the patient, corroborated by stereoröntgenograms, establishes the presence of fluid with unmistakable cer-

tainty. All that remains to be ascertained is whether this fluid is blood, pus, or serum. A puncture will decide the question.

Quite different and difficult is the diagnosis of lung-abscess. A patient may be ill for weeks or months, carrying an abscess in his lung without its detection by the most painstaking search of the ablest diagnosticians. Even repeated puncture may fail to reveal its presence.

The cause of this difficulty is apparent when we consider that a lung-abscess is usually much smaller in size than an empyema, is more centrally located, and is often surrounded by healthy lung-tissue, or associated with a pneumothorax.

I regard a stereoröntgenogram of the entire chest as the most helpful aid in the diagnosis of lung-abscess. We rely upon this one aid more than upon all the other diagnostic means except the history of the case. The stereoscope separates the different structures in the chest. The overlapping shadows, which in the single plate produce an indistinct and blurred picture, stand out in plastic effect, so that the lung abscess may be detected.

When a lung-abscess has once ruptured into a bronchus, the diagnosis is, as a rule, very easy,—in fact, we cannot escape it. It forces itself on one with the expiration of the patient's first breath when he begins to relate his complaint. Not all lung-abscesses, however, have this characteristic foul odor. Some have no odor at all, but the patient will give the history of rupture of the abscess. He will relate how all at once he spat up a cupful of matter. Such cases, however, offer great difficulty in the localization, because the abscess sac is collapsed and never fills sufficiently to give a distinct shadow in the röntgenogram, or a sufficiently large area of dullness which can be outlined by percussion.

The diagnosis ascertained, the surgeon must decide what form of treatment to use. The accepted procedures are so well known that I shall not discuss them in this paper, except to make a few suggestions which may be helpful in preventing the formation of persistent drainage.

The empyema should be drained as low as possible and preferably posteriorly. Many cases persist in discharging because the tube has been inserted too high, and a recess formed by the dome of the diaphragm and the chest-wall allows the retention of quantities of pus. When the drainage is low, the suppuration will usually cease within three or four weeks; occasionally it will persist for three or four months. A small residue, about one case in twenty, will keep on discharging indefinitely, especially a lung-abscess which communicates with one or more bronchi. I have in my records of 110 consecutive cases of this last mentioned type of empyema and lung-abscess, a case in which the sinus resulting from drainage persisted for thirty years.

When there is no tendency to spontaneous closure, the problem becomes a very difficult one. The patient usually resigns himself to his misfortune, dresses his chest-wound once or twice a day, and is well enough to perform some light work. Whenever his health suffers, he becomes discouraged and is willing to take great risk; he will submit to any operation that will either cure him or commit him to his grave.

Ten years ago we introduced into surgery a new method of dealing with this class of cases; namely, the injection of bismuth paste. It is unnecessary here to repeat in detail the advantages and technic of this method. By this time the bismuth method is well known, and the results from its employment and its dangers are all well defined. Let it be said that after ten years of trial, in almost all parts of the world, it has retained its place and is employed more extensively

now than ever. The reports in the literature indicate that at least four out of five cases of the very old neglected suppurative empyemata or lung-abscesses may be cured by this simple procedure. Ochsner, of Chicago, reported to the American Surgical Association on June 4, 1909, 14 cases of empyema, all of which had been operated on (two by Estlander's operation), with sinuses in all cases persisting nevertheless. He applied the bismuth paste in each of these cases, with the result that 12 cases healed completely and 2 were still under treatment at the time and very much improved. Others have reported equally good results. In my own series of 110 cases, approximately 80 per cent were cured by the bismuth-injection treatment alone.

Omitting minor details it will be of benefit to mention some practical points in the technic:

Subsequent to a physical examination a stereoscopic röntgenogram of the entire chest (plate size 14x17) should be taken. This is a splendid guide to rational surgical treatment. The röntgenogram of an empyema or lung-abscess resulting from tuberculosis of the lung will invariably give a characteristic picture; namely, a chronic or healed tuberculosis of the lung parenchyma, calcification of glands, and linear scar markings within the healed tuberculous lung-tissue. A non-tuberculous case will show healthy, transparent lung-tissue around the rather well-defined lung-abscess.

After the pathological condition is ascertained and cultures taken, the cavity is injected with a 10 per cent bismuth-vaseline paste: bismuth subnitrate 10.0; vaseline 90.0.[3]

When the cavity or sinus is completely filled with this mixture, another set of stereoröntgenograms is

3. In former years I employed a mixture containing 30 per cent bismuth subnitrate, but found that the above mixture produces equally good results and is not likely to cause bismuth-absorption.

taken. This set will illustrate the exact size of the cavity and its relation to the ribs and other structures in the chest. Whenever a communication with a bronchus exists, the patient will at once cough up the excess quantity of paste.

A word of caution is here necessary: the patient should be warned not to take a deep inspiration during the injection. He is apt to inhale (through the existing opening of a bronchus on the infected side) some of the mixture, and force it into the bronchus of the opposite side.

The cavity may hold as much as 600 grams, but from 100 to 200 is the average. I here illustrate with Figure 1, which gives the definite outline of the cavity filled with air before the injection, showing the thickened pleura covering the contracted lung, thus dividing the left chest into two almost equal sections.

The second röntgenogram (Figure 2) shows the cavity entirely filled with bismuth, and plainly shows the inner boundary of the cavity to be formed by the thickened pleura. The sizes and shapes of these cavities vary so much that there are no two cases alike. Sometimes we find a small globular sac communicating with the outer chest-wall by a long tortuous channel; and then again we find that there exists merely a long sinus which communicates with a bronchus, without any cavity whatsoever. The stereoscopic effect permits us to estimate with considerable precision the depth of the cavity and its location (Plate I[4]).

As stated before, these bismuth injections are not only of great diagnostic but also of therapeutic value. The first injection does not always produce healing. It requires at times repeated injections during several months, but, whenever the discharge changes from pus to a serous character, the injections should be stopped, because healing will usually follow. Only when the discharge continues to be purulent should we consider more radical surgical procedure.

I have tried to ascertain why some cases respond to the bismuth treatment and why others do not, and I have come to the conclusion that whenever the cavity holds more than 200 grams it will be less likely to heal by bismuth injections. Cases which communicate with the bronchi are also more resistant than simple empyema.

Some cases will heal shortly after the injection and remain closed for a year or two and the patient be in good health, often gaining as much as thirty pounds, and then the sinus will reopen. The injections are then to be repeated. Closure usually follows for another year or two, only to have another relapse after that period. The patient often prefers to keep on treatment in this way, not being much inconvenienced and perfectly well in the intervals.

But there remains a small number, about one in five cases, which have no tendency whatever to heal under any form of treatment, and these require the most radical surgical procedure.

The methods in vogue in dealing with these refractory cases are known as the Estlander, the Schede operation, or the decortication of the lung. The patient who has to submit to one of these extensive surgical procedures is, of course, in a desperate situation. He is told that the operation causes a high mortality and that the surgeon cannot promise him an absolute cure even with this method. Aside from that, the surgeon must warn him of the prospect of a considerable deformity of his chest, whether he be cured or not. I have always hesitated to advise such extensive procedure; and, in the last seven years, I have not resorted to any of the above mentioned operations.

SLIDING SKIN-FLAP OPERATION FOR LUNG-ABSCESS

During the past seven years I have employed a surgical procedure in these cases which is far less dan-

gerous and is, I believe, more effective than the Estlander or similar operations.

The patient is placed in a semirecumbent posture and anesthetized. Before incising the skin a rubber catheter is introduced into the existing sinus and kept there as a guide during the first part of the operation. The skin-incision differs in almost every case. It depends entirely upon the location of the abscess or empyema. I have devised and employed three different types of skin-incisions, the Y shape, the X shape, and the trap-door incision. I illustrate here each of these incisions schematically (Figs. 3, 4, and 5).

It will be noted that each of these incisions forms one or more flaps of skin of various lengths, which are intended for implantation into the lung abscess after it has been exposed. The skin is not dissected from the underlying fat or muscle until we are ready to implant it into the abscess cavity.

From three to five ribs overlying the abscess cavity are now widely exposed; and as many are resected as seems necessary to expose the lung-abscess to its full extent. In cases of empyema even more than five ribs may have to be resected. One should not hesitate to remove as much rib length as seems feasible, four to seven inches of each if possible. In cases of empyema, where the cavity usually extends into the apex, we should endeavor to include the third rib in the resection, if possible. This will facilitate the implantation of the skin flap into the very recess of the apex of the pleura, and prevent the granulation of this recess which occurs when the skin flap does not cover it completely.

The ribs removed, a small incision of the thickened pleura is made along the catheter, the finger is introduced into the abscess cavity and the cavity explored.

The incision of the pleura is extended upward to

the highest point, without cutting into the lung, and then the cavity is fully exposed to ocular inspection by removing as much of the parietal pleura as possible. This will usually make the opening into the abscess cavity large enough to introduce the entire hand.

In most cases of chronic empyema, the lung will be found retracted upward and inward. At times the apex will contain functionally normal lung. In the cases of lung-abscess, however, the matter is different. The globular or multilocular cavity, with thick septa, exists, into which frequently open one or more bronchi. In one of my cases seven bronchi opened into one lung-abscess. (Case shown at the Western Surgical Association in 1914.)

The cavity being fully exposed, it should be swabbed with dry gauze, and the usually smooth surface of the abscess wall sufficiently scarified either by rubbing it roughly with gauze or even resorting to a mild curettage. This is done for the purpose of producing a favorable condition for the adhesion of the skin flap.

The cavity being dry, the tips of the skin flaps are drawn into the very deepest recesses by means of forceps. Gauze is packed tightly against them, to keep them in contact with the raw surfaces of the abscess cavity. No suture whatever is used.

The denuded surfaces from which the skin flaps are taken are then covered with sterile gauze, and no attempt is made to reduce the size.

At this stage the operation is completed, while in the Estlander a great deal more work is necessary to complete it. The procedure should not last more than 100 minutes in the very extensive cases and can be done in 60 minutes in the less extensive ones. From a series of nine cases I cite only two for illustrations.

EMPYEMA PLEURÆ, WITH SINUS

The procedure just described was carried out on a

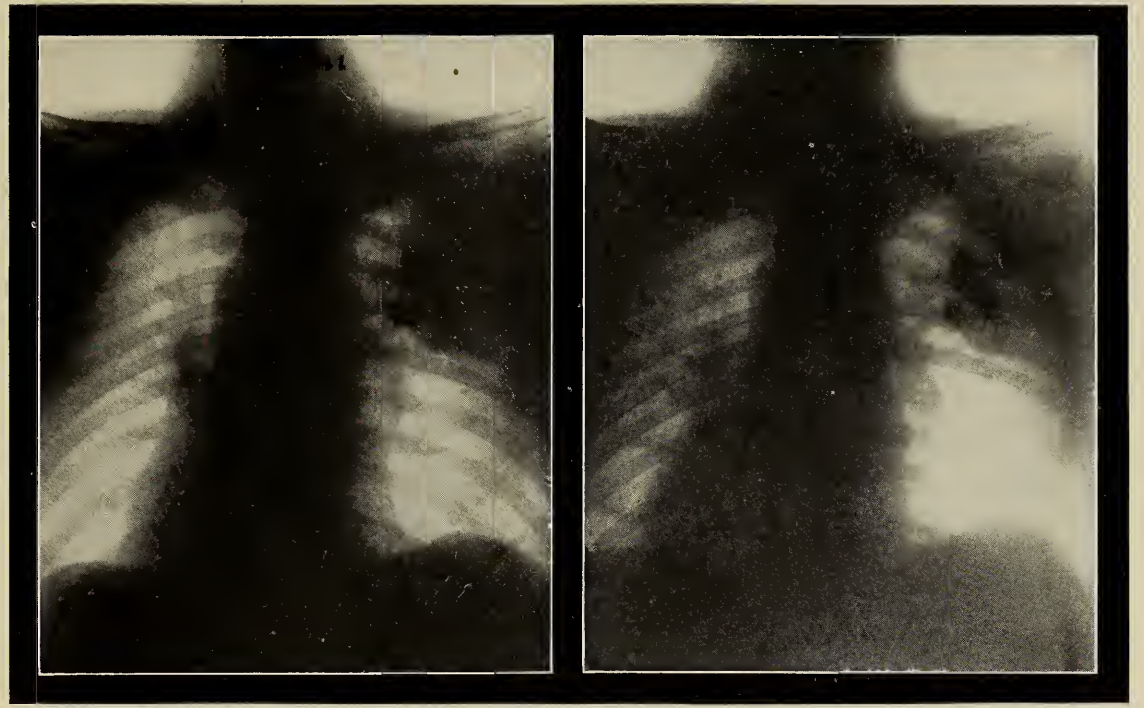

Plate I. Bismuth paste injected into lung abscess connecting with bronchi.

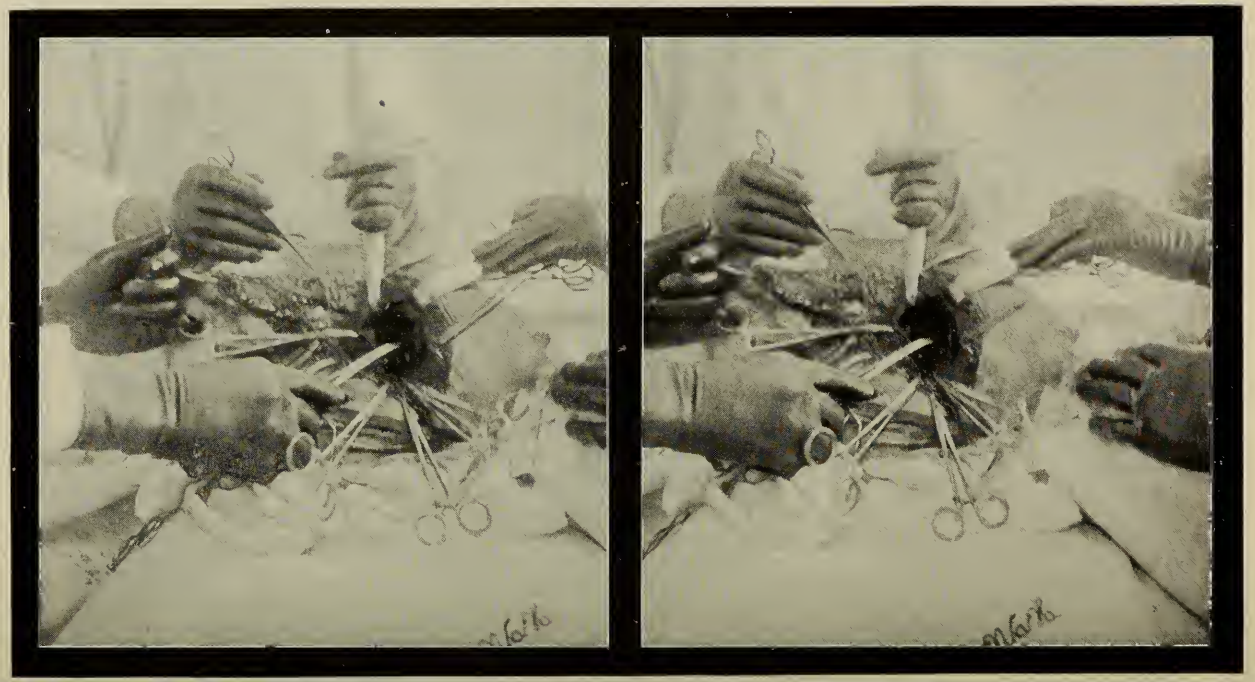

Plate II. Lung abscess exposed; skin flap being held outward, covered with warm salt sponge.

Plate III. Showing cauterization of the mucous lining of the bronchus, by means of Percy cautery.

Plate IV. Implantation of skin flap into depth of the abscess cavity. Kept in place by gauze packing.

Plate V. Final result. Complete obliteration of abscess and opening into bronchus. Only short funnel, lined with skin, remaining.

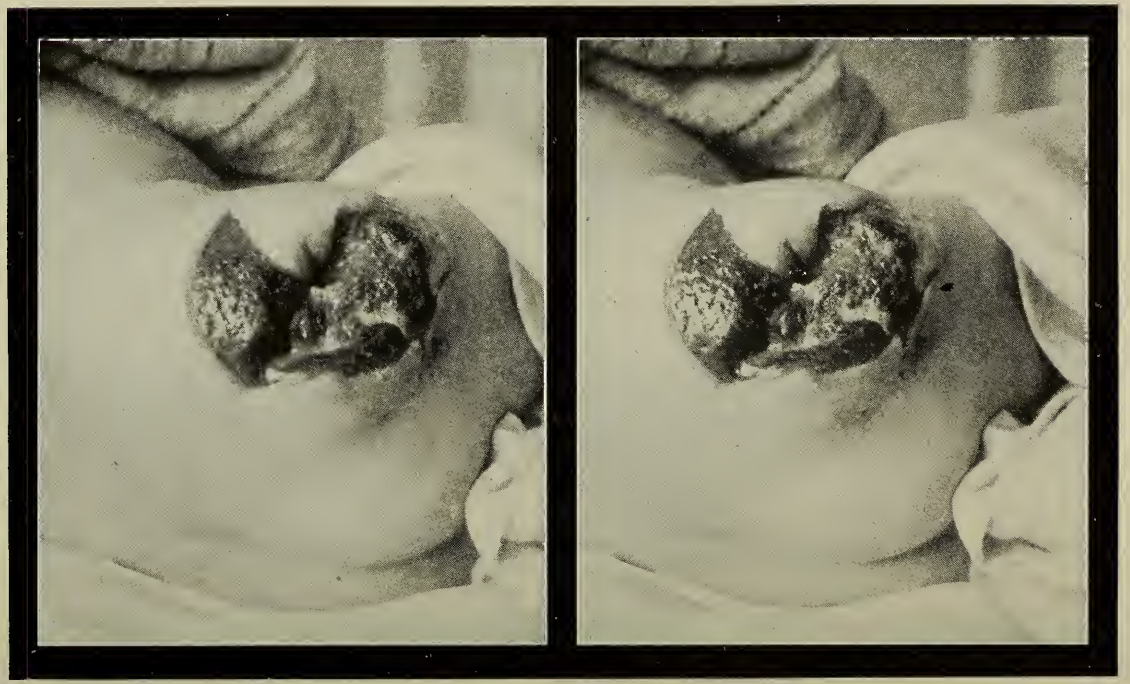

Plate VI. First operation. Implantation of skin flap into acetabulum. Trochanter exposed but not removed.

Plate VII. Second operation showing the technique of the implantation of a flap into the lower part of the cavity in the hip-joint, after the greater trochanter was removed.

young man, 26 years old, who retained a fistulous empyema subsequent to a pleuropneumonia six years ago. The case had the usual history of resection of one rib, rubber drain, with no tendency to cessation of the discharge:

I first saw him four years ago (1913). His temperature rose daily to about 100 degrees; his weight was 123 pounds. The empyema cavity would hold 22 ounces of the bismuth. Subsequent to the injections the cavity closed and he was in good health for about two years. Since then the abscess has reopened three times at intervals of six months.

The patient's health began to deteriorate, and he returned in June, 1917, for the radical operation. The cavity was then discharging large quantities of pus, holding about one quart of fluid. A culture showed staphylococcus in pure culture.

The operation took place June 30, 1917. Although the work was done under unfavorable conditions, a film camera having been operated, causing frequent interruption, yet it took less than an hour to complete it. Four days later, the patient was able to walk around in the halls of the hospital. The cavity gradually diminished in size until at the present time it will not hold more than two Mayo sponges, whereas at the time of operation, I could introduce my entire hand into the cavity. Figures 6, 7, 8, and 9 illustrate some phases of the operation.

The technic will naturally vary a little in every case. Where bronchi communicate with the abscess-cavity, the technic is considerably changed. For this reason, I shall illustrate such a case, but mention only the principal difference in the technic.

LUNG ABSCESS WITH OPEN BRONCHUS

A girl of nineteen developed a lung abscess at the age of five, which was drained in the axillary line, in the region of the fifth rib. Constant discharge for fourteen years with expectoration of pus, in spite of all treatment, was the deciding factor for this extensive operation. A flap including skin, fascia, and muscle, eight inches in length, with the base toward the axilla and the apex pointing downward, was raised and the ribs exposed (Plate II). Two sections of the fourth and fifth ribs were removed. This laid open a small abscess cavity, so small as to be considered a portion of the bronchial fistula. The walls of the abscess cavity were smooth and

glistening, and in this respect different from the epithelial lined bronchial opening.

The abscess cavity was explored with the finger. No foreign body was found, but on inspection the opening into a large bronchus was visible. The actual cautery was employed in this case to destroy the mucous membrane in the large bronchus, and thus insure complete obliteration of the opening. In order to prevent a fire, the ether anesthesia was interrupted, and for about three minutes the patient was given oxygen by inhalation, to get rid of all the ether in the bronchi. The mucous membrane of the bronchial opening was destroyed by means of the Percy cautery (Plate III).

The steps in the implantation of the skin flap are practically the same as in the first case cited (Plate IV).

The further treatment of the case consisted in the adhesive plaster method of epidermization of the raw surfaces and daily dressings, until the entire cavity had been covered with epithelial growth. The discharge and cough stopped a few days after the operation and the patient gained 30 pounds in weight. The final result is shown in Plate V.

If the abscess cavity remains widely open, the cauterization of the bronchus may be done subsequently at different sittings. The procedure is entirely painless and causes no other discomfort than the irritation produced by the smoke from the burning flesh, drawn into the trachea and nostril during inspiration.

The correct after-treatment in these cases is of the utmost importance. The gauze packing should not be removed for 48 hours. After this period the skin flaps will usually have become firmly adherent and the gauze packing can be safely removed without detaching them, although great care should be taken against such mishap. A spatula should be pressed against the skin flap, while the gauze is being pulled out. No irrigation or medication is necessary, merely careful packing. This should be repeated daily, and it will be noticed that the cavity is growing smaller from day to day and that the skin is gradually growing from the edges of the skin flaps, paving the cavity by degrees.

The most gratifying observation is the fact that the

reduction of the size of the cavity is not due to filling of granulation-tissue, but rather to the expansion of the underlying lung, so that after a period of several months the skin flaps, which were deep down in the cavity, are now very much nearer the surface of the chest and only a shallow depression or a short funnel eventually remains.

The minor details and changes in procedure in individual cases must be left to the good judgment of the surgeon. He who attempts this class of work must have mature experience in general surgery. A novice had better not begin his career with such extensive operations.

CHRONIC SUPPURATIVE OSTEOMYELITIS, TRAUMATIC AND PATHOGENIC

Aside from the vast number of cases of chronic bone and joint suppuration which result from diseases, such as tuberculosis, syphilis, and systemic pyogenic infection, we encounter many chronic suppurative bone lesions due to *external injuries,* such as compound fractures and gunshot wounds, also from bone-plating and other operations. The traumatic types will, no doubt, be very prevalent after the present war. The progress made during the past three years in the treatment and especially in the prevention of suppuration after gunshot and shrapnel wounds, surpasses anything that has previously been done. Nevertheless, there is bound to be a vast residue of cases in which surgical procedures, as well as the prophylactic measures, have failed.

I shall illustrate by striking examples that some of these apparently incurable cases can be entirely healed by a method of operative treatment which I have employed with great satisfaction in thirty-five cases during the past five years. The method of procedure differs from the treatment of chest cases just de-

scribed only in technic, the principle being practically the same. The illustrations here presented will be more helpful in teaching the technic of this operative procedure than a verbal description.

The bismuth-paste treatment should precede the operative treatment in every case, in order to save the patient an operation, if possible. I am pleased to say this is accomplished in more than 65 per cent of cases.

It is superfluous to mention again the technic in employing bismuth paste. It has been fully described in my previous publications.[5]

Guillot and Woimant[6] present a valuable contribution to the subject of early sterilization of the infected wounds and the late suppurations. They advocate, first, the Carrel-Dakin method of sterilization, usually followed by injections of different combinations of paste. They give preference to the bismuth paste, as they have observed no toxic effects and have obtained good results. They also advocate, after sterilization of the wound, the implantation of fat and suture of the wound.

Those who have studied their report and observations and who will compare them with those contained in this article, will observe the essential difference to be as follows: They suture the wounds, while I do not; they use watery irrigation preceding the paste injection, while I omit all watery flushings.

I believe the sutureless method to be preferable, since it does not lock up the paste mixtures, which, after all, are foreign substances and may lead to absorption and poisonous effects. The scars resulting from the sutureless method are not objectionable, as they are very inconspicuous.

We discarded the practice of flushing sinuses with watery solutions long ago, and have obtained very good results without them. It should, therefore, be established by those who are using flushings and the

paste afterward whether the use of the paste alone will not accomplish as much.

As to the choice of the different pastes which are now being employed in practically all the war hospitals, I do not venture to dogmatize. I have now employed the bismuth-vaseline paste for ten years with very gratifying results and have found no reason to employ other new mixtures. This, however, does not preclude the possibility of an improvement, and I shall be pleased to adopt any other combination of paste as soon as I am convinced that it is superior to the bismuth.

The "b. i. p." mixture advocated by Rutherford Morrison of England is said to produce very favorable results. I used the combination of iodoform and bismuth when I first introduced the method about ten years ago,[7] but on account of its odor, to which the patients objected, I had to discontinue it. I have found no difference in the results since its discontinuation. I would, however, warn against the closure of the wounds after the iodoform or bismuth mixture has been injected. Iodoform is even more toxic than bismuth. We have had our sad experience with bismuth intoxication, which, fortunately, we are now able to avoid entirely.

It is, of course, essential that sequestra should not be allowed to remain in bone-cavities, otherwise the bismuth treatment will not be effective. To ascertain the pressure of sequestra and foreign bodies, it is essential to take stereoscopic röntgenograms and submit them to a qualified röntgenologist. Upon his interpretation of the röntgenograms depends the decision as to whether an operation is indicated or not.

I consider the injection of bismuth for diagnostic purposes in these cases most essential, and at the same time I enter a protest against the use of the probe as a diagnostic instrument. The probe is very mislead-

ing when we wish to ascertain the depth of sinuses or bone-cavities. One needs only to glance at one of these röntgenograms in which the sinuses have been injected (Fig. 10) to convince himself that the use of the probe in ascertaining the course of the tract borders on the ridiculous. The tip of the probe may be resting in the nearest pocket or recess of the tract, and leave us under the impression that we have reached the bottom, whereas in fact there may be a network of sinuses into which the probe can never be introduced. In fact, the sinus at times may be twice as long as the probe itself.

Curettage of the bony cavities without ocular inspection is likewise inefficient, especially if it is done blindly by introducing the curette through the sinus opening and scraping in all directions. Such a procedure is mere guesswork. No one can know whether he has reached all the diseased areas. Many times I have convinced myself of this by exposing the cavities which I had curetted and found that I had curetted in the direction of healthy bone and left the most diseased area untouched. Even exposure of the bone cavity and a very thorough curettage under ocular inspection does not always prevent the recurrence of the suppuration.

The customary procedure, for instance, of curetting the shaft of the femur, introducing a drain at one end and sewing the skin over the wound, will, in most instances, result in failure. A channel usually remains underneath the sutured skin and the suppuration soon returns.

The Mosetig-Moorhof plug, if properly introduced, may be of real service in such cases; but I shall describe a surgical procedure which I believe is more dependable.

SKIN-SLIDING OPERATION FOR OSTEOMYELITIS

After the diseased area is located by means of the

röntgenograms, it is freely exposed by cutting away all the unhealthy skin and scar tisue. The diseased bone is then thoroughly curetted or chiseled away until one is certain that there is not a vestige left. Should this produce a deep groove, it must be converted into a very shallow one or even into a flat surface by cutting away a sufficient quantity of healthy bone on either side.

After this is done, a skin flap is cut from one or each side, sufficiently large to cover almost the entire denuded bone surface, care being taken, however, that no subcutaneous fat is carried with it. The flaps are then shifted into the depth of the cavity and retained there by packing gauze against them. It is not absolutely necessary that every part of the bone-cavity should be covered. The skin will grow from the edges of the flaps until every portion of the raw bone surface is covered with true skin. To prevent retraction or slipping of the skin flaps I have frequently used a carpet tack to fasten temporarily the tip of the skin flap to the bone until adhesion has taken place. The areas of muscle and subcutaneous tissue which have been exposed by sliding the skin are left denuded. No attempt should be made to bring their edges together by suture or otherwise. In only very rare instances has it been necessary to use any suture material whatever, except, of course, the ligation of bleeders.

Forty-eight hours later the gauze pack which has kept these flaps in apposition to the denuded bone surface is removed, and it will be found that firm adhesion has already taken place. In one case, in which an assistant displaced one of the flaps during the application of the dressing immediately after the operation, I was unable, twenty-four hours later, to replace the skin flap in its proper place, until I had loosened it with a raspatory. The rapidity with which adhesion

of the skin to the bone takes place is remarkable. (Fig. II; this case six days after operation.)

The after-treatment is most interesting. As soon as granulations on the denuded surfaces from which the skin has been removed, begin to form, strips of adhesive plaster are applied, covering the margins of the skin border and the granulating surface all around the wound. This procedure will produce rapid epidermization of the denuded surface. The adhesive is changed daily. Within two or three weeks large areas will be covered by healthy skin and in practically every instance the suppuration will stop after the denuded area has been epidermized. Small scars, of course, remain, but will gradually shrink, so that a denuded surface the breadth of three fingers will have a scar no wider than one-half centimeter.

When the wound is not too deep, the skin flap may be omitted. It is simply left widely gaping, and packed with gauze and allowed to granulate from the bottom. Later on adhesive plaster is put on the edges of the wound.

I have employed this method of skin sliding in a variety of cases: osteomyelitis of the femur, tibia, in hip-joint disease, in knee-joint disease, in the removal of the os calcis and of the metacarpal bones, in osteomyelitis of the ribs and of the sternum, and in other cases, including infected fractures and other injuries.

I shall now illustrate the efficiency of this procedure by some typical cases selected from my series.

TUBERCULOSIS OF OS CALCIS—REMOVAL AND SKIN-FLAP IMPLANT

Lillian P., colored, aged 8. Stepped on a pin with right heel two years ago. The pin was extracted, but a temperature of 104° followed, one foot became swollen, and an abscess resulted, which was drained. Suppuration continued, and she remained in a hospital for six months. During her stay at the hospital, incisions into the heel were made at thirteen

different times, then she was discharged as incurable. Ten months later, the left hip became swollen and painful. Tuberculosis of left hip was diagnosed. Rest in bed four months. While an abscess was prevented, the limb gradually became thinner and shorter. In September, 1917, we find the right heel twice the normal size, with three profusely discharging sinuses. (Fig. 12.) Stereoscopic röntgenograms show destruction of the entire os calcis. (Fig. 15.) The left limb is three inches shorter than the right, the muscles atrophied. Stereoscopic röntgenograms disclose a healed tuberculosis of the hip-joint, the head being entirely absorbed and the joint ankylosed. Diagnosis: tuberculosis of right os calcis, associated with healed tuberculosis of the left hip.

Operation.—A tongue-shaped flap with its base upward at the back of the heel was dissected. The tendo Achillis, which was still firmly attached to some of the fragments of the os calcis, was divided. This gave splendid access for the removal of the entire os calcis. (Fig. 13.) Instead of suturing, the flap was pushed into the cavity produced, and gauze packed against it. Within twenty-four hours the skin flap was adherent, and filled part of the large cavity. The defect grew smaller each day and finally healed completely, and the foot assumed nearly normal shape. (Fig. 14.) The child is now able to walk since a pair of shoes has been provided for her. The right shoe has a padding in the heel to make up the deficiency. The left foot was provided with a regular three-inch high-sole shoe to overcome the shortening due to the hip disease.

TWO CASES OF TUBERCULOSIS OF THE ANKLE

Florence B., aged 5, had tuberculosis of the right ankle, which progressed so rapidly in spite of all treatment in a well-equipped hospital, that, within two years from its inception, amputation of the foot was recommended. The child was unable to walk, and profusely discharging sinuses persisted after several minor operations had been performed.

On March 15, 1917, I performed a radical operation by the skin-sliding method. Figure 16 illustrates the flap incision with exposure of the metatarsal bones, the tendons being held back by a gauze strip. The metatarsal bones were removed and the skin flap implanted. (Fig. 17.)

The final result of this case is shown in Fig. 18, the child being able to walk with only a perceptible limp and able to flex and extend the foot to almost the same degree as her healthy foot.

A very similar case is that of a boy eight years old, in which the disease had destroyed practically all the metatarsal bones and the os calcis. The condition was so deplorable that nothing but an amputation seemed advisable. (Fig. 19.)

A complete excochleation of all the diseased bones was done by large openings on both sides of the foot, a suitable skin flap being provided in the incision on either side. These flaps were inserted deeply into the cavities. The final result is shown in Figs. 20 and 21, all the sinuses having closed, the boy being able to flex and extend the foot, to wear an ordinary stock shoe and to walk without a crutch. (Figs. 20 and 21.)

CHRONIC OSTEOMYELITIS OF THE TIBIA—TWO-STEP OPERATION

Miss I. C., aged 26, when eight years old, was kicked in the leg by a cow. Two years later the leg suddenly became painful and swollen, and within six weeks an abscess opened in the center of the tibia. Two months later an operation was performed at home, but this failed to check the pus discharge, and from that time on she has had repeated operations without any beneficial results.

In April, 1909, I took stereoröntgenograms, and found that the entire length of the tibia was involved in a chronic suppurative osteomyelitis, but the discharge was present only at the lower end of the tibia. (Fig. 22.) I excised the skin overlying the diseased bone, chiseled off as much of it as possible, and allowed the cavity to granulate. The skin grew in from the sides and left a small scar.

In May, 1915, the patient returned on account of pain in the upper part of the tibia and high fever. At this time I performed what I have described in this paper, a skin-sliding operation, removing the diseased bone from the head of the tibia and sliding a flap of skin about four inches in length into its depth. Healing took place rapidly, and the denuded surface of the tibia was covered with healthy skin within two months.

She remained perfectly well until August, 1917, when she complained of pain in the middle of the tibia. A stereoröntgenogram proved that there was a sequestrum in the center of this bone, and another plastic skin-sliding operation was performed, using two skin flaps, one from each side to meet in the deep recess of the tibial canal. Figures 23, 24, and 25 illustrate the different phases of this procedure and the results. At the present time the entire limb is in perfect condition, no sinuses existing.

TUBERCULOSIS OF THE STERNUM

Miss D., dressmaker, age 40, has been suffering from disease of the sternum for sixteen years. After five unsuccessful operations performed during this period, four profusely discharging sinuses remained. (Fig. 26.)

I saw her first in 1912, injected the sinuses with bismuth paste, and suppuration ceased for about six months. Thereafter I curetted the sinuses and injected them again, which produced a cessation of discharge for one year. From then on, the sinuses kept on suppurating and the condition grew worse. The patient lost in weight, and she suffered a great deal of pain.

On January 20, 1917, I performed the skin-sliding operation, as illustrated in Figure 27. The skin covering the area involved was excised, the lower part of the sternum exposed and resected, and the deep bed from which it was removed curetted. A triangular flap of healthy skin was then cut from underneath the left breast and slid over into the depth of the cavity and kept there by compression of a gauze packing. The denuded surface of the breast was not sutured. Within six weeks the entire denuded surface was obliterated, partly by the contraction of the skin edges and partly by new growth of skin from all borders. (Fig. 28.)

In this case we illustrate how the implanted skin flap, which at the time of operation reached into a deep funnel-like depression, has gradually risen toward the surface, so that at present it is almost level with the rest of the sternal surface. The patient's general condition has improved from the time of the operation, and she has gained some 20 pounds in weight.

DERMOID CYST MISTAKEN FOR RECTAL FISTULA

G. M., aged 60, was operated on ten years ago for what was then supposed to be a rectal fistula. The operation was very extensive, having produced incontinence and later a stricture of the rectum. In 1914 the condition became very much aggravated, a very profuse discharge of pus from the rectum, pain and severe eczema around the anus, and gradual emaciation, compelled him to seek further treatment.

Intrarectal examination revealed a sinus opening in the posterior rectal wall, about two inches above the anus. The pus virtually poured from this sinus. The injection of bismuth paste into the cavity revealed a large area undermining the anterior aspect of the sacrum and coccyx. Diagnosis at

this time: coccygeal tuberculosis with abscess formation. Operation: Instead of the longitudinal incision usually employed for the removal of the coccyx, I made a triangular flap with the apex pointing toward the anus. Raising the skin flap, I resected the fat and the coccyx and found underneath a fibrous structure resembling an indurated cyst wall. A urethral metal sound was then introduced through the rectal sinus, and the wall of this sac was pushed upward into the wound and incised. The skin flap was pushed into the depth of the wound to meet the opening just made into the sac.

Our diagnosis was then changed to dermoid cyst, the sac having contained a few long hairs. Figure 29 illustrates the condition a week after the operation, the skin flap having already healed in the depth of the wound, now about two inches deep. The pus now discharged through the external opening instead of the rectum. The bismuth injections were carried on through the external opening, and within a short period the suppuration stopped, and both the intrarectal and extrarectal openings healed. The large wound contracted gradually and at present there is only a small depression in the region of the coccyx, as shown in Figure 30.

OSTEOMYELITIS OF FEMUR

Mr. B. The case here illustrated represents a type of chronic suppuration from the femur not very uncommon. The sinuses usually form near the ham-string tendons and the disease is most persistent, lasting indefinitely. Operations for this class of cases are particularly unsatisfactory. I have adopted a procedure entirely different from that heretofore employed.

The bismuth treatment had in this case been tried for six months without much effect. It was discovered that the shaft of the femur up to the middle of the thigh was filled with sequestra and pus. The knee joint was also affected. The operation here illustrated was preliminary to a resection of the knee-joint, which was done later. Amputation was refused by the patient.

It is unnecessary to describe the steps of the operation, since the legends below the illustrations explain the technic as well as the underlying principles in the treatment. (Figs. 31 to 36.)

The disease in the femur is now entirely healed. Resection of the knee-joint as well as the operation of the tibia, was performed later, the same principle having been carried out.

TUBERCULOSIS OF THE HIP OF FIFTY YEARS' STANDING. OPERATION

Mr. D., aged 54, fell out of bed when about four years old and soon after developed tuberculosis of the hip, which re-

sulted in the entire destruction of the hip-joint, which remained quiescent for about thirty-five years. The limb remained infantile and contracted at the age of forty, abscesses formed, and many sinuses opening around the hip resulted. The condition improved spontaneously until three years ago, when he developed a severe pain in the hip and new abscesses began to develop. From this time on, conditions grew rapidly worse and he began to lose in weight and suppuration increased. He presented himself in October, 1916, with four sinuses profusely discharging from the right hip, associated with severe tenderness, an edematous and eczematous condition.

The stereoscopic röntgenogram shows a large network of sinuses surrounding the femur and the acetabulum. Injections of bismuth were continued, and soon given up as futile, there being a number of sequestra in the hip, and the case was then considered incurable. Six months later, I reconsidered the matter and performed a radical skin-sliding operation. The hip-joint was exposed by cutting away all the diseased skin overlying it, the acetabulum was freed from all necrotic bone, the head having been destroyed previously. A healthy skin flap was denuded from the region of the buttocks and implanted into the depth of the cavity (Plate VI).

A month later another operation was performed, as shown in Plate VII, which illustrates the second step of the operation. This consisted of the resection of the greater trochanter and the implantation of another very large skin flap, to pave the lower part of the exposed hip-joint. This flap, about four by six inches in diameter, was denued from the lower part of the buttocks and implanted in the usual manner. Plate VIII illustrates the condition two weeks later, and Plate IX three months after complete healing had taken place.

The patient gained twenty pounds in weight, and is in perfect health, but of course has an ankylosed short limb.

During the evolution of this skin-sliding method of treatment, I have from time to time presented some of the cases before medical associations and since then a number of my confrères have reported to me their satisfactory results in trying out this method. I therefore anticipate that now when the method has been perfected and when there is such an abundance

of material in which it can be employed, its usefulness will be readily established.

SUMMARY

To sum up, I would advise the following procedures:

1. The methods of primary sterilization by means of aqueous flushings of wounds should be thoroughly tested to determine whether or not they are effective and practical without the additional use of pastes.
2. That the wide excision of tissues as now practiced in the war hospitals should be adhered to, as a means of preventing chronic suppuration.
3. That in cases in which early sterilization was not obtainable and the wounds persist in suppurating, the bismuth-injection treatment or its similar substitutes should be employed, before any radical operation is resorted to.
4. That in the residue of cases in which the bismuth treatment is not effective, the sutureless method of skin-sliding, as described in this paper, should be employed, since with this method we are able to clear up nearly all of these apparently hopeless cases.

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2. Simonds, J. P.: Jour. Exp. Med., 1917, June 1.
4. The stereoscopic pictures accompanying this article may be viewed through the ordinary hand stereoscope, being specially printed with that purpose in view.
5. Surg., Gynec. & Obst., 1917, xxv, 507.
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DISCUSSION

Dr. D. S. Fairchild (Clinton, Iowa): I have been much interested in this paper because we have had some personal experience in treating cases of lung abscesses and cases of necrosis or osteomyelitis of the tibia. In treating cases of osteomyelitis of the tibia by the sliding flaps I got the idea

from some work I saw in Mt. Sinai Hospital, New York, where they are doing the sort of work that Dr. Beck has described.

In the past two years we have had several cases of abscess of the lung and old empyemas, under the care of my son, where it was impossible to bring about complete and satisfactory healing, and we have done in those cases what Dr. Beck has described. The idea of this procedure we obtained from Dr. Beck's writings on this subject, and I can add my testimony to the value of this class of treatment.

As regards the bismuth paste: Of course, this question is one that we have discussed for a long time, and it is unnecessary to take it up here.

I wish to add my testimony to what the doctor has accomplished in regard to these cases of sliding skin-flaps in old empyemas, where the discharge has gone on for years and years without any apparent prospect of recovery.

Dr. John L. Evans (Wichita, Kan.): I wish to say a word or two in regard to the healing of granulating wounds by means of adhesive plaster, which Dr. Beck is using about the denuded areas, particularly in cases in which he uses sliding skin-flaps. I have used the principle for a number of years. The late Dr. Brokaw, of St. Louis, taught me how to use them in cases of varicose ulcer, covering the edge of the wound with adhesive strips. You can use it in cases of burn. This granulating surface does not become infected. These surfaces resist infection, and you can strap them with adhesive plaster, and the wound will heal in one-third of the time over any other method I have attempted.

Dr. C. H. Lemon (Milwaukee, Wis.): I would like to add my testimony to the value of this procedure, particularly in the treatment of cases of chronic osteomyelitis of the tibia, and also in the treatment of extensive burns, especially electric burns. With the increased use of electricity in the industries, men are working on high potentials, working around them, and are more or less safeguarded by the use of rubber blankets, but occasionally they get hung up and receive severe burns, particularly of the chest and arms. In the treatment of these cases I know of nothing that is so valuable as the method that Dr. Beck has described, and which I have used in a considerable number of cases.

Dr. Beck is somewhat ingenuous when he tells you that you do not need to suture these skin-flaps. I have seen him do this work in the Chicago Hospital, and he did not suture the

skin-flaps at all, as he has told us; but he did not tell us the reason why he did not suture them. In two cases in which I tried to pull the flap down by a suture I lost the flap. With these extensive sections along the tibia the slightest traction is sufficient to destroy the entire flap.

I have had some experience in chronic osteomyelitis of the radius. I have found, however, that, in these old cases of chronic osteomyelitis following compound fractures, I get perhaps better results by not dissecting the flaps on either side, but by making a circular flap such as we make in doing bone-graft operations, and laying the flap down over the entire surface of the bone, and then later on lessening the wound by the use of circular adhesive strips around the leg. I have come to the conclusion that, after a thorough operation is done on the tibia, it is safer to take the entire skin and subcutaneous tissue for the flap, if used in this way, rather than take thin skin dissected over a large area, because I think there is a better blood supply, and it is astonishing how six or seven inches of the tibia can be healed up in a few weeks by the use of this method.

Dr. A. E. Benjamin (Minneapolis, Minn.): Dr. Beck has asked me to say a few words on this subject. I think we should congratulate Dr. Beck on his excellent work. We must remember that in work of this sort there are one or two principles we must hold in mind. In the first place, in order for a wound, when infected, to heal well we must have good drainage, and this drainage is perhaps best afforded by removing the wall on the outside; that is, converting the wound from a sinus into a cavity which is crater-like and which will drain thoroughly, and over which the flaps may extend without any interruption of the circulation. If we have a wound in the bone or an osteomyelitis and do not remove all the dead bone, and do not remove the edges of the wound thoroughly so as to make a very smooth surface over which these flaps may pass, there is apt to be some destruction. I know that we are getting results now which we did not get before by putting these flaps right down into the bottom. In making these flaps, I have made use of one flap from above and one from below, a tongue-like flap, so that gauze can be placed on top of them to hold them down. I am convinced that most of these cases will heal without any other treatment. The tree-surgeon has shown us the remarkable results of treatment of wounds in trees. The dentist cleans out a tooth-cavity thoroughly, and converts it into a wide-open cavity,

and fills it with some material. We have imitated them in that respect by using the bismuth paste and Moorhof bone wax; and now we have this plan of Dr. Beck's in lung cases which really shortens the period of treatment remarkably.

Dr. Beck (closing): I want to correct a statement that I think I made to Dr. Lemon, namely, that you should not use subcutaneous tissue. If I said that, I did not mean it. You should remove the subcutaneous fat because it has little blood supply.

Dr. Lemon asked why these flaps fail when we suture them? They fail because you strangle them. You put in six or eight stitches which have very much the same effect as a noose around a man's neck. These flaps cannot live when they are strangled.

LOCAL ANESTHESIA

FREDERICK G. DYAS, M.D., F.A.C.S.

CHICAGO, ILLINOIS

The development of the various forms of anesthesia has not kept pace with the advancement of surgical technic.

Generally speaking, there is about as much hazard to the patient from the administration of a general anesthetic as there is from the performance of a major operation itself in competent hands. This statement applies both to the immediate and remote effects of the anesthetic.

Medical men have been so engrossed with matters of surgical technic that, only too often, the question of the anesthetic has been given scant consideration. The unfortunate patient usually fell into the hands of the youngest member of the hospital interne staff, who was vastly more interested in the progress of the operation than in the administration of the anesthetic. This, of course, resulted in many tragedies until the method now in vogue in most of our large hospitals was put into operation, namely, the employment of a salaried, skilled anesthetist to take the place of the green interne. This movement resulted in a great improvement in the post-operative complications and gave the surgeon a sense of security during the course of the operation, which was in marked contrast to the constant anxiety as to the anesthetic under which he labored in former times.

However, general anesthesia can probably never be robbed of a certain amount of hazard, no matter what agent be used or how skilled the anesthetist; therefore it is the duty of the medical profession to adopt local for general anesthesia whenever possible. Young children and very nervous individuals will probably always require general anesthesia for operative work, but the number of operations which can be satisfactorily performed under local anesthesia upon normal individuals is rapidly growing, and it is a striking fact that physicians and nurses who have had opportunity to observe the practical effects of local anesthesia nearly always choose that method for operations upon themselves.

The method of local antedates that of general anesthesia, for it was practiced by the ancient Arabian physicians in the form of nerve-compression. Large nerve-trunks were subjected to pressure until anesthesia was produced in the area supplied by that nerve.

Cold, applied directly to the affected part in the form of ice and, later, freezing sprays, is a method known even to the laity. Many of these sprays have been extensively used, and have filled a very important part amongst local anesthetics.

Chemical agents, such as poppy, Indian hemp, mandrake root, opium, ether, and chloroform, were extensively used locally until the discovery of the hypodermic method of medication by Wood, in 1853. This opened up a wide field for the local administration of drugs believed to have anesthetic properties, and was closely followed by the discovery of the anesthetic properties of cocaine, by Scherzer, in 1860. Cocaine was first used for surgical purposes by Reclus, who later abandoned it because of its toxicity.

Schleich popularized the use of cocaine by using it in combination with morphine in dilute solution as cocaine hydrochloride. However, cocaine has had a

bad history, and the profession was afraid to use it extensively for major surgical work. As a result of this fear an attempt was made to find a less toxic agent. Various drugs have been used, many of them extensively, but it remained for novocaine to fill the long-felt want. This substance is said to be about only one-seventh as toxic as cocaine, and yet possesses to a remarkable degree its property of inducing analgesia. However, this fact is of the greatest importance, namely, that novocaine used in sufficient dosage to produce satisfactory local anesthesia is practically without toxic effect. In the summer of 1916 another substance was introduced experimentally to take the place of novocaine, which was almost impossible to procure. The name of this agent is *apothesine,* and it was distributed to a number of men working with local anesthesia by Parke, Davis & Co. About eighty-five major operations were done with the apothesine supplied to me, which is used in the same strength and dosage as novocaine. Its toxicity is probably about the same as novocaine, and it has the same resistance to boiling. As a local anesthetic it appeared in no way to be inferior to novocaine. Unfortunately, apothesine is not obtainable at the present time, but the hope is held out that it will be put upon the market before long.

"The degree of toxicity of most drugs depends upon the rapidity of their absorption. Three-tenths to 0.4 gm. of novocaine in aqueous solution may be dangerous when rapidly absorbed, while 0.5 to 1.0 gm. may be safely used where absorption is slow. Prolonged boiling destroys the action of novocaine, but boiling two or three minutes does not harm. The anesthetic effect of novocaine may be prolonged by using solutions of magnesium sulphate and calcium chloride in strengths of one-fourth to one-half of one per cent." —M. L. Harris.

Potassium sulphate likewise increases the duration of analgesia when combined with novocaine.

Hertzler says the duration of novocaine anesthesia without an adjuvant is about fifteen minutes, but its action is more prolonged when adrenalin is used.

Balfour[3] states that the healing of wounds has been retarded by the use of novocaine in the cases observed in the Mayo Clinic.

Braun,[4] whose book on local anesthesia is classic, proved by experiments upon himself and others that the addition of one-half per cent potassium sulphate to the novocaine solution, markedly prolonged the anesthesia.

Harris has recently used chloretone for the purpose of increasing the duration of the local anesthesia. Chloretone is added to the novocaine preparation in sufficient amount to form a saturated solution. It is necessary to bear in mind that chloretone volatilizes at a temperature of 160° F.; therefore, after boiling the novocaine solution time must be allowed for the temperature to subside to 160° F. or lower before adding the chloretone.

Bier's method of local anesthesia consists of the intravenous injection of novocaine between two ligatures or bandages tightened about a part. This method has no advantages over the method of infiltration or nerve-blocking, but carries with it the added danger of rapid absorption from the venous circulation when the constriction is removed.

For a long time local anesthesia was almost wholly confined to operations upon the eye, the nose, and the throat. In major surgery the local method for a long time fell into disrepute because of the toxicity of cocaine. Braun makes the statement that, were it not for the introduction of the less toxic novocaine and adrenalin, which made possible the development of the technic of infiltration anesthesia and nerve-block, the

method of local anesthesia would in time have been abandoned.

Braun[5] states, further, that the chief points of the new technic of local anesthesia are the infiltration of the field of operation, the blocking of the sensory nerve-paths, and, where it is possible, a combination of the two methods with a direct infiltration of the line of incision. Esmarch's constriction of an extremity is not necessary to procure good anesthesia where adrenalin is employed. Many operators employ "twilight sleep" to procure a tranquil state of mind for their patients, and I can recommend this strongly to those who have not used it as an auxiliary to the local anesthetic. Too little attention has been paid to the psychic condition of patients, whether they were to receive a general narcosis or a local anesthetic. While Crile justly receives the credit for calling attention to the enormous importance of anesthetising the patient under the proper environment and in such a manner as to quiet his fears, many others appreciated the necessity of preserving absolute quiet in the anesthetising room. Loud noises and the clatter of instruments may often unnerve a patient, and they always increase the amount of anesthetic and the length of time necessary to procure narcosis. The same principle holds true in local anesthesia.

Krönig and Sigel[6] thus speak upon this point: "We avoid disturbing the patients by light or sound. Patients in 'twilight sleep' are particularly susceptible to stimuli of light. To avoid this, the patient's ears are plugged with cotton and the eyes bandaged. With these precautions we produce in the majority of cases a complete amnesia of the operation and preliminary preparations. Thus we accomplish the first of Crile's requirements, that is, the elimination of psychic trauma."

Bloodgood[7] says, "During a successful operation

with local anesthesia the blood-pressure remains normal. Sudden rises indicate painful manipulations. When these are continued they are followed by a fall in the blood-pressure. This means shock." During the past eighteen months I have done certain operations only under local anesthesia, but with each succeeding month I have extended the use of the infiltration and nerve-blocking method until now fully one-half of my operative work is done without the aid of a general narcosis.

No man who has given the matter consideration can help feeling that under the usual methods of anesthetising patients, the hazard to them from the use of a general anesthetic, even in skilled hands, is too great, not to mention the danger of post-operative complications.

Ether, chloroform, nitrous oxide and oxygen, or ethyl chloride may cause death per se in dosage sufficient to produce good narcosis. Novocaine and certain other agents used to produce local anesthesia are practically without danger to the patients in amounts necessary to produce complete analgesia of the operative field.

Ether and chloroform cause post-operative nausea and vomiting, and acute dilatation of the stomach, and increase the gas pains following laparotomy. More remotely, ether not infrequently causes post-operative pneumonia, and chloroform may produce degeneration of the liver parenchyma.

Recently I performed a herniotomy under ether anesthesia, because on that particular morning I was unable to procure any novocaine. The patient began to cough up a rusty sputum on the third day, and in the following twenty-four hours presented the classic picture of a lobar pneumonia. I believe this pulmonary complication was directly chargeable to the use of ether. While the man recovered, his convalescence

was considerably prolonged, and he had had unwillingly conferred upon him an increased susceptibility to pneumonia.

In two cases recently operated on for inguinal hernia under infiltration and nerve-block, the patients were given full meals of meat and potatoes, unknown to those in attendance, three hours after the operation, which they ate with relish and without bad effect. One of these men felt so well that he persuaded another patient to smuggle him his clothes, with which he walked the length of a long ward and indulged in a cigarette within four hours of the conclusion of his operation. It goes without saying that few ether patients enjoy such a sense of well-being on the day of the operation.

The use of local analgesia compels greater gentleness in the manipulation of tissue. This lessens local trauma and post-operative pain.

In out-patient dispensaries patients may be immediately discharged following minor operations, which from an economic standpoint is of the greatest importance both to the individual and to the hospital.

When an anesthetist is not available, the operator who uses local anesthesia is able to proceed unaided.

The arguments most frequently heard against the use of the local method are that it is time-consuming and produces imperfect analgesia. The first objection may be answered by the fact that frequently the production of a general ether narcosis takes longer than does the interruption of pain-conduction by nerve-block or infiltration. This is especially true of hemorroidectomy, as evidenced by the fact that many patients wake up during ether anesthesia when the sphincter ani is dilated, and require considerable more ether to continue the narcosis.

The objection of imperfect analgesia may fairly be said to depend upon the skill of the medical attendant,

as the ability to produce satisfactory anesthesia increases with training and experience.

The use of various agents for the production of local anesthesia by the methods of infiltration and nerve-block, is becoming daily more a matter of routine. Braun gives in detail the statistics of three large German hospitals covering the last ten years of cases done under general and local anesthesia, showing an increase during that time from less than one per cent to over fifty per cent of cases done under local anesthesia.

This is a striking proof of the growth of this method, and I feel confident that a study of the post-operative morbidity and mortality reports would show greatly in favor of the local method.

PERMANENT NERVE-BLOCK FOR CHRONIC INTRACTABLE PAIN

Great as are the advantages of local anesthesia, I believe that its greatest field of usefulness has just been opened up. I refer to the permanent nerve-block for the relief of chronic pain. This method of treatment must be reserved for those patients who have gone beyond the hope of other relief, as in recurrence of malignant tumors after operation. If it were possible, by the injection into the nerve-trunks that supply the painful area, to produce a localized analgesia, the necessity for the use of morphine would be obviated, and the unfortunate patient might be conducted to a peaceful end.

It is well known that morphine and other drugs of its kind do not entirely control the severest pain. I recently lost a case of recurrent carcinoma of the breast with enormous swelling of the arm upon the affected side, in which the pain toward the last could not be controlled entirely by hypodermic injections of

one and one-half grains of morphine every two hours. It is in such a case that the proposed method of alcohol injection of the brachial plexus by the method of Kuhlenkampf, would render the entire upper extremity anesthetic. Of course, at the same time there would be a motor paralysis, because the nerve-trunks are made up of both motor and sensory fibers. However, the loss of motor power under such conditions would be negligible.

The same method can be used in carcinoma of the pelvic organs by blocking the sacral plexus. For hopeless conditions of the upper abdomen the paravertebral injection of the intercostal nerves might be employed. This method was suggested to me by the well-known use of solutions of alcohol in from 40 to 60 per cent strength, for injection of the trigeminus nerve in cases of tic douloureux.

Those who have used this method most extensively say that perfect analgesia is produced whenever the alcoholic solution reaches the nerve-trunk. This analgesia persists from six to eighteen months. If this same analgesia can be produced in the nerve-paths that conduct the painful sensation from the diseased area, we shall be able to produce as complete a loss of pain for as long a time as in the case of trigeminus neuralgia.

I, therefore, predict for this method of local anesthesia its greatest field of usefulness, and believe that the method of local anesthesia will continue to find more adherents for its use, both for the production of temporary and lasting local analgesia.

CONCLUSIONS

1. The patient's life is not endangered by dosage sufficient to induce local anesthesia.
2. The general comfort of the patient after opera-

tion is much improved because of lessened trauma and decreased gas-pains.

3. Convalescence is not complicated by the anesthetic, and is thereby shortened.

4. Ambulatory patients may be immediately discharged after operation.

5. An anesthetist is unnecessary, but a "moral anesthetist" is desirable.

6. The use of adrenalin renders the field less bloody, prolongs anesthesia, delays absorption, and thereby lessens toxicity.

7. Nerve-block as a lasting anesthesia for chronic pain should find as wide an application as its use for operative procedure.

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DISCUSSION

Dr. Roger T. Vaughan (Chicago, Ill.): I should like to ask Dr. Dyas if he has seen any trophic ulcers following the brachial plexus anesthesia of Kulenkampff or after sacral plexus anesthesia?

Dr. William M. Harsha (Chicago, Ill.): Dr. Dyas deserves credit for making a broader application of local anesthesia than we usually get. I think in the exigencies of war it is important to have as many methods of inducing anesthesia as we possibly can; and the plea that was made before the American Medical Association last year by Gatch was timely, namely, that the subject of anesthesia and the administration

of anesthetics should be taught in the medical schools as a part of the curriculum. The average patient is more afraid of the anesthetic than he is of the operation. I think nearly all of you will bear me out in that statement.

The use of a local anesthetic disabuses the mind of fear, and, if the operation is not undertaken too quickly, it answers the purpose in many cases. Of course, in abdominal work it is not so valuable because we cannot anesthetize the viscera, and, while they are insensitive to pain in some forms of handling, traction causes pain. Local anesthesia in removing the prostates of old men is of great value. The bladder wall can be infiltrated so that prostatectomy or the removal of stones can be done very easily; but in ordinary intestinal operations, where we have to make any traction upon the tissues, local anesthesia is of less value because we cannot control all the pain.

An objection sometimes to the use of novocaine, apothesin or cocaine, is due to an attempt to operate too soon after the hypodermic injection. The use of cocaine and novocaine, if we wait a little time, gives a sort of exhilaration on the part of the patient that enables him to stand a lot of pain that he otherwise would not stand. Time is a very important thing, and a surgeon should not cut too quickly after the use of a local anesthetic.

Dr. R. E. Farr (Minneapolis, Minn.): The paper presented by Dr. Dyas opens up a very large subject. In our work we have employed local anesthesia quite extensively, and we base our satisfaction on certain premises which are at variance with the beliefs of most men who use local anesthesia. We believe that novocaine can be used in very large doses, and that it is generally used in too small doses, and that the unsucecssful anesthesias seen are attributable to this fact more than to anything else. Another great drawback is the amount of work which the surgeon must perform in order to introduce the anesthetic. The use of local anesthesia is inhibited to a great extent for this reason. We should have some way of introducing the anesthetic which is quick, easy, and simple. For this purpose I have devised an apparatus called the "Pneumatic Injector." It is described in the literature. With this instrument the injection for any operation can be made with the greatest ease in from two to five minutes.

We have found that novocaine can be used with comparative safety in sufficiently large doses to give complete anesthesia of the abdominal wall. A painless incision through the

abdominal wall will give in every case a negative intra-abdominal pressure when the abdomen is opened; in fact, the most perfect relaxation we ever see, except in spinal anesthesia or the deepest general narcosis. The pathological condition is then determined visually, and strong traction on the posterior wall avoided. The stomach and gall-bladder may be examined by a suprapubic incision by making vertical retraction. No abdominal packs are used except for protection. If packs are found necessary, in order to hold back the viscera, the anesthetic has been improperly given. We have done under local anesthesia practically every operation that has come along, not excepting the cases of children.

The crux of the whole situation seems to be the manner in which the abdominal wall is anesthetized and opened, and I wish to say a few words regarding the technic. The first wheal is intradermal, and its making should be the only pain felt by the patient. The rest of the infiltration is subdermal, subsequent wheals being made from beneath with the point of the needle impinging against the finger on the skin. All layers of the abdominal wall, even the peritoneum, are infiltrated before incision is made. With the abdominal wall retracted vertically a negative intra-abdominal pressure will be obtained. The patient may be tilted so as to make use of the force of gravity in exposing the pathology, and we have practically the condition one notes at autopsy. On the other hand, if the patient is caused any amount of pain while the abdominal wall is being opened, a defensive maneuver will produce a positive intra-abdominal pressure, which forces out the viscera, and an effort to force them back causes more pain, and there results a vicious circle, which immediately calls for general anesthesia. We begin all of our laparotomies under local anesthesia, and during the last three years approximately 90 per cent of these have been completed without the addition of general anesthesia.

Dr. Joseph Rilus Eastman (Indianapolis, Ind.): I do not agree with the statement that novocaine is non-toxic. I have used it on dogs and rabbits, and find there is toxicity in novocaine. It is true, it takes a great deal of novocaine to kill a rabbit if the novocaine is injected subcutaneously, but it takes much less if the novocaine is injected intravenously; and, unless one is careful, it is possible to introduce novocaine accidentally into a vein. Therefore, I think that one should endeavor by removing the syringe barrel from the needle to discover whether the needle has entered a vein. It takes only

one-quarter as much novocaine to produce air-hunger and paralysis in a rabbit if the novocaine is introduced intravenously as it does if it is introduced subcutaneously.

There is such a thing as idiosyncrasy against novocaine. Every man of us here could recall at least one case of serious novocaine poisoning. In those individuals who have this idiosyncrasy very small doses of novocaine will suffice to produce sometimes dreadful symptoms, so that I believe it is of practical importance for us to employ this precaution, not to introduce the novocaine quickly, as my friend Dr. Farr has said, but to introduce it first slowly and cautiously. It is important to introduce just a few minims of novocaine and then wait five or ten minutes. There is no need to hurry when we are using local anesthesia. One can well afford to wait ten minutes. There is no way of discovering this idiosyncrasy except by trying out novocaine in that particular or specific case. Give a small dose of it, say 15 or 20 minims of the solution, and then wait ten minutes to see whether or not you have symptoms of poisoning. We used novocaine that was prepared by the original manufacturer, in a hospital in which I worked in Vienna. It so happened that the patient was a young lieutenant, son of a field marshal, and was one of the most important cases that we had to deal with. He was an important personage. He had a wound of the lung. I introduced with a hypodermic needle a few drops of novocaine, and the young man went into collapse. It was with the greatest difficulty that we restored him. He had the typical air-hunger, and dragged one leg for a period of forty days.

Dr. Earle R. Hare (Minneapolis, Minn.): I rise to disagree with Dr. Eastman with reference to the use of novocaine, for the reason that I have been in very close touch with the work which Dr. Farr has done with local anesthesia for a period of ten or eleven years. I am sure that, if Dr. Farr had had a moment longer to speak to you, he would have said one thing in speaking for local anesthesia, namely, that it must be introduced properly. By properly introducing novocaine, it can be done without much danger, and, so far as I have observed, its introduction is practically without any danger to the patient. By properly I mean constant moving of the needle. The needle should not be introduced under the skin and the novocaine introduced immediately without moving the point of the needle. for the needle may enter a vein, and if novocaine is introduced into a vein, it is a well known

fact that there is likely to be collapse following the use of a small quantity of the drug.

I want to relate an instance which happened to a member of my own family. This member of my family, sitting in a dentist's chair, suffered a severe collapse following the use of a few drops of novocaine which probably entered a vein in the alveolar process. This may have been an idiosyncrasy, but I do not believe so, for on subsequent occasions larger amounts of novocaine were introduced in the same patient, and no collapse followed; and, it seems to me, this proves that there was no idiosyncrasy in this particular case.

I feel that the use of local anesthesia is condemned largely because of the lack of technic in reference to its use. This does not apply to everybody, but it does apply to a large majority of men who use it. I have used it, and I do not get the successful results that my friend Dr. Farr does because of my lack of experience and my lack of efficiency in technic, but I do believe that the point which we want to emphasize is the one of constantly moving and maneuvering the needle-point in order that we may avoid injection of the novocaine directly into the vein.

Dr. B. Merrill Ricketts (Cincinnati, Ohio): During October, 1884, Koller discovered cocaine, and I have the only description of the use of it he has ever written. It is a personal letter. He now resides in New York. The first operation under cocaine anesthesia was done in November, 1884, by Dr. D. B. St. John Roosa for enucleation of an eye, which I witnessed. Since that time, when I served my internship, I have done surgical work with local anesthesia on my own responsibility. I began the use of cocaine as a local anesthetic, and I have continued its use more or less extensively ever since. I have amputated thighs, lower legs, the upper arm, the lower arm, have done mastoid operations, and, in a number of cases, have ligated vessels under local anesthesia. In several of these cases I have had some toxic effect from the use of the drug. The late Dr. Norton had an epithelioma of the lip. He was seventy-two years of age at the time. I used local anesthesia, cauterized the lip, and with toxic effect. He became very much excited, but recovered without risk.

I recall a man who came in from Montana for plastic work on the face. During an hour and forty minutes I used eight grains of cocaine on the face. The effects are greater with the use of this drug in the neck and face than in other parts of the body. He was highly poisoned with the drug, but

recovered after operation on the lip, nose, and ear. Novocaine is supposed to be seven times less toxic than cocaine. There is hardly an operation that I have not done with cocaine anesthesia. I have removed appendices, opened the gall-bladder, operated for obstruction of the bowel, done amputations, ligated vessels, and sutured nerves. I have been quite aggressive in the work with local anesthesia, and have used it when I could not induce others to do so.

Dr. Souther, of Cincinnati, commenced fifteen years ago to operate under local anesthesia, and has continued to do so extensively.

I feel that cocaine and novocaine are coming into their own. We talk about their toxic effects, but what of the toxic effects of chloroform, ether, etc. Let us take a case of intestinal obstruction. If you add to that condition a blow with pulmonary anesthesia with gas, chloroform, or ether, it will make the operation more hazardous. If you can operate on such a case with local anesthesia, very well and good, but the difficulty is this: You have been trained to do surgery, and it seems to me that it is our province to master the technic of local anesthesia, and do the surgical work also. I do not permit anyone to prepare my anesthetic solution. I do it myself. I carry the crystals in my satchel, and make the solution myself according to the operation I am to do and the subject I am to work on. If I am to amputate a thigh I use more of the drug. I also study the temperament of the individual on whom I am to operate, particularly the patient who is excitable, and use a less amount in the patient who is excitable than in one who is not excitable.

In the house of a man, sixty-two years of age, with pneumonia, I made a diagnosis of abscess in the middle lobe of the right lung. The man's condition was pitiable. He had been sick three or four weeks. Under local anesthesia I resected an inch and a half of two ribs, and opened the abscess, drained an ounce of pus, and he lived three weeks thereafter, and died. Had I given that man a general anesthetic I do not believe he would have survived the operation. So local anesthesia is one of the greatest innovations we have, and we should all learn the technic of its use.

Dr. Leonard Freeman (Denver, Colo.): All of these operations can be done under local anesthesia, but it is a question whether it is always expedient to do them under a local anesthetic.

Dr. W. A. Dennis (St. Paul, Minn.): Our President

(Dr. Freeman) has hit the nail on the head. I would not go as far as Dr. Farr does, but there is a large class of cases in which local anesthesia is particularly indicated, especially in the aged for any considerable operation, and also in people with high blood-pressure to whom the additional insult of the anesthetic is serious. There is no reason for giving a general anesthetic in a case of empyema, as the operation can be done with local anesthesia. We operate on strangulated hernias under local anesthesia because we believe a general anesthetic is a decided disadvantage in such cases. Lower has described a technic for removal of the prostate under local anesthesia, and since then we have been successful in doing that. We have operated for the removal of papilloma of the base of the bladder in a woman, sixty-five years of age, whose blood-pressure was 250, the operation having been done under local anesthesia and without pain. In selected cases local anesthesia is very valuable.

I believe that Dr. Eastman's explanation of idiosyncrasy is probably the correct one. In those cases in which idiosyncrasy is manifested the probabilities are that the anesthetic has been injected into a vein. I have had one case which seems to confirm that. One of my associates had an acute appendicitis, and requested that the operation be done under local anesthesia. The operation was done without any difficulty and without any toxic effect whatever. Later he wished to have his hemorrhoids operated on, and this operation was also done under local anesthesia; but shortly after he was taken back to bed his skin became white and clammy, and he broke into a profuse perspiration. His pulse practically disappeared, and, while this was temporary, not lasting more than half an hour, after which he was all right, still it seemed to show a marked toxic effect from the local anesthetic. Certainly, the chance for getting the anesthetic into the veins would be much greater about the rectum than in an abdominal case.

I believe the precaution taken by Dr. Farr and mentioned by Dr. Hare is the one to use to overcome this possibility, namely, not to begin to inject the anesthetic until you have commenced withdrawing the needle.

Dr. Dyas (closing): In reply to Dr. Vaughan's question as to whether or not I have seen trophic ulcers following the use of brachial plexus block; I wish to say that I have not seen any. It would destroy the nerve undoubtedly to introduce the solution in such quantities and so rapidly that there

would be great pressure on the trunk, and trophic ulcers could result therefrom.

As to the toxicity: I do no think I made the mistake of saying that novocaine was non-toxic, but it is non-toxic in dosage sufficient to produce local anesthesia. There is such a thing as idiosyncrasy towards novocaine or cocaine.

As to the bad results following hemorrhoidectomy: We have had very much better success from using local anesthesia than general. In cases of empyema there is no reason for using general anesthesia; in fact, there is no excuse for it. I have had one unpleasant experience in the case of a woman who died following resection of the ribs.

The toxicity varies in proportion to the rapidity of absorption and the concentration of the solution. If the suggestion made by Dr. Eastman is carried out of ascertaining whether or not blood flows from the needle which is not attached to the solution, the possibility of injecting into the veins can be obviated.

SPLANCHNOPTOSIS: ITS CAUSE, PREVENTION, AND CURE, WITH SPECIAL REFERENCE TO THE DURET-ROVSING OPERATION

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PROLEGOMENON

In May, 1881,[1] Dr. Glenard, of Lyons, France, made the observation that many cases of nervous diseases were accompanied by a prolapsed position of the stomach. He proved this by palpation and percussion which were advanced by his technic to a degree hitherto unknown. He soon afterward found that the other abdominal structures were prone to prolapse, especially the transverse colon, and the right kidney. From the time of this discovery of Glenard we may very properly date an era in the development of the science of medicine.[2]

The profession of France very early recognized the importance of these observations, and we take a lively pleasure at this time of revision in bringing to light a statement made by Fereal, at a meeting of the Hospital Medical Society, Paris, December 24, 1886. After discussing neurasthenia and enteroptosis, he proceeded as follows:

"The studies of Glenard confirm the exactitude of the anatomic-physiological ground which served for the basis of his studies. As to the application of these

principles to pathology we must render homage to the original quality which the author has shown in their supposition. Glenard's language shows that he has profound faith and absolute conviction in the correctness of his views, and this is probably the secret of his therapeutic success."

"However we may think, French medical men, especially, should acclaim the new ideas emanating from Glenard, and not wait to give them welcome when they may be returned to us from the other side of the Rhine with a borrowed name."

FREQUENCY OF PTOSIS OVERLOOKED

I am inclined to believe that the medical profession has not yet appreciated the importance of ptosis of the abdominal organs, nor the success of the treatment of these conditions; and it is the object of this paper to call renewed attention to this subject.

Medical men seem prone to overlook the simple and obvious, and to delight in theorizing and speculating as to the cause of obscure disease. This is particularly true regarding neurasthenia and gastroptosis. Hundreds—yes, thousands—of women have been condemned to a miserable existence as hysterics or neurasthenics, who could be relieved if their abdominal ptosis were considered and relieved by bandages or operation. Rovsing says when the day for revision arrives nearly all the so-called nervous affections of the stomach will be found to be ptosis of the stomach. He makes a sharp distinction, which may not be justified, between the cases occurring in the virgin, and in the married woman who has undergone several confinements.

THE SYMPTOMS OF GASTROPTOSIS

These patients, when they come for examination, exhibit the following conditions:

1. Emaciation.
2. Constipation, or diarrhea alternately with constipation.
3. Nervousness.
4. Have pains coming on after being on foot several hours, and relief by lying down or by support of the hands or the bandages. These pains are not relieved by lying on the side.
5. Very often there is pulsation of the abdominal aorta, visible especially when in a standing position.
6. There is usually vomiting.

THE GLENARD SYNDROME

The Glenard syndrome has been expanded in the course of the years until it now embraces more or less completely the following:

A.
1. Splanchnoptosis.
2. Gastroptosis.
3. Enteroptosis.
4. Coloptosis.
5. Floating kidney.
6. Floating liver.
7. Floating spleen.
8. Mobile colon.
9. Hernias of all kinds.
10. Descendsus diaphragmatis.
11. Descendsus cordis.
12. Varicocele.
13. Hemorrhoids.
14. Intestinal adhesions, kinks, etc., causing chronic constipation, intestinal catarrh, ulcers and strictures.
15. Prolapse of the female genital organs.

B. All nervous and mental disturbances resulting from above, such as neurasthenia, nervous depression, simulated heart disease, etc.

These subdivisions are intimately related, and all deserve consideration; but our present study must be limited almost entirely to prolapse of the stomach and the large bowel. The possible causes of these conditions will be enumerated; the prevention of them will be considered; and some of the measures, physical and surgical, which have been devised for improving pathological conditions, will be detailed.

SHORT STATEMENT OF TOPICS

Much has developed since Glenard first promulgated his fundamental ideas. The one great instructive factor has been the *x*-ray; and from it we have learned—

1. That only occasionally the stomach is seated in that portion of the abdominal cavity which old theory and anatomical text-books provided for it. The same is true of the transverse colon.

2. That both sexes and all ages are prone to have displacement of these organs, but that females over thirty are afflicted in proportion to males as four to one.

3. That improper habits of eating and rushing to active labor after meals, are probably conducive to prolapse.

4. That the corsets and constricting belts of young girls cause weakness of the abdominal muscles, which fail to support the stomach and bowels.

5. That high-heeled shoes and insufficient clothing of women are causing muscle-strain and congestion of the abdominal contents.

6. That the now fashionable constricting leather belts are working similar results in young men.

7. That, while it may seem to be true that some people have prolapsed organs without symptoms, it is probably much the same condition of affairs which exists when a loop of bowel is in a hernial sack out-

side of the natural cavity. This is always highly interesting and possibly dangerous.

8. That there has been a complete change in our conception of the ordinary forms of colitis, and that we now believe these diseases, formerly considered of nervous origin, are primarily not nervous.

9. That many cases of abdominal prolapse can be cured by proper bandaging, posture, and dieting, and that no operative procedures should be attempted until these simple means have been tried. Especial warning should be given at this point, else we will have operating perverts bring disrepute on this operation, as they have on appendectomy, etc.

10. That Lane's plan of resecting large portions of bowel is only exceptionally necessary, and that probably, when the proper attention is given to the early stages of intestinal disease, it will never be done.

11. That operations attaching the stomach and gut to the abdominal wall are capable of giving good results, even if there are theoretical objections to their employment. Duret, of Lille, first did a gastropexy with excellent results, but, unfortunately, this was not appreciated, and it remained for others to develop this operation, notably Rovsing, of Copenhagen. My experience would seem to indicate that the operation is not difficult, and can be carried out in patients desperately emaciated, and that good results are often obtained.

12. Infections of the sinuses, teeth, and tonsils are, in a great many cases, the cause of that "weakened condition" so often mentioned by authors. This "weakened condition" is responsible for the loss of tone of the muscles of the abdominal wall. The detection of these infections is best obtained by the radiograph.

RESTATEMENT AND AMPLIFICATION OF TOPICS

1. *The stomach and transverse colon seldom lie in*

ideal position.—The revelations of the *x*-ray certainly came as a distinct surprise to the older surgeons, who had been taught anatomy on the old lines. The illustrations of the more recent text-books are misleading in this matter. The revelations of the fluoroscope and the *x*-ray plate are so uniform that we feel amply justified in the statement of the infrequency of the normal position of these organs.

2. *Both sexes and all ages affected.*—According to Albu it seems that even new-born infants are prone to ptosis of the abdominal organs, and, strangely enough, girls are more prone to this condition than boys (11% boys and 44% girls).

Again, the aged are particularly prone to prolapses, owing to the bad habits of youth and middle life, to be detailed later.

Stiller[3] says the Jewish and Slavic races are more prone to the affection than other races, and residents of cities suffer more than country people.

3. *Improper habits of eating and failure to rest after meals, conduce to prolapse.*—Any one who observes the daily life in the business centers of our large cities, must be impressed with the rapidity with which food is devoured, washed down, usually, with copious drafts of ice-water, and topped off with ice-cream or indigestible dessert. We cannot wonder that the overloaded stomach refuses to act, and "falls down" on the job. For a number of years I was consulted by many trolley-men and conductors on a large electric line who complained of dyspepsia. I found these men carried, in their buckets, cold, indigestible foods, which they consumed while attending to their exacting duties. That the stomach rebelled was not remarkable.

A country physician's wife, to save her husband annoyance at meal-times, answered all his telephone calls. Immediately the meal was finished she hastened

to prepare her house for any patients who might appear, causing considerable physical and mental agitation during the meal-time and no rest afterward. The result, as might be expected, was a dilated and ptosed stomach. The complication in this case was an ethmoid-sinus disease.

4. *Corseting of young girls.*—While there has been a certain amount of improvement in the construction of corsets, yet I believe it remains true that the tendency of these "straight jackets" is to squeeze the waist-line and interfere with the proper functioning of the abdominal muscles, and thereby the natural support of the abdominal wall is lost. The weight of clothing, held in place by tight bands and strings at the waist-line often adds to the difficulty.

When a girl who has followed this custom comes to her pregnancy she has little muscular support for the wall; and she often supplies this by additional corsets and bandages. When the pregnancy is terminated the muscles are permanently stretched and weakened, the abdominal contents drop, the uterus sags, varicose veins develop in the legs, hemorrhoidal veins of the rectum become enlarged, and she may become a neurasthenic invalid. All authors agree in laying an indictment against the corset.

5. *High-heeled shoes, high-cut skirts, and insufficient clothing.*—These are causing strain on the muscles, and congestion of the abdominal organs. No argument is necessary to prove this.

6. *Clothing of young men.*—Suspenders are no longer fashionable for men. Warm under-clothing is no longer fashionable. Thin-soiled shoes and no overshoe to protect the feet from cold and dampness, is the vogue. All these tend to ptosis of the abdominal organs. Should we not sound a note of warning?

7. *Prolapsed organs without symptoms.*—We hear and read a great deal about cases having splanchnop-

tosis without knowing it. This may be true, but much in the same sense that we occasionally find individuals, even doctors of medicine, running around with loops of bowel in both inguinal canals, or even in the scrotum, doing their ordinary professional work. Our duty in such cases is always to warn of impending trouble, and to endeavor to correct the deformity and relieve the conditions causing it. To keep silence is sure to send the patient to an Osteopath or a Christian Scientist for relief of obscure pains, supposedly in the spinal column, on the one hand, or in the certainly weakened brain, on the other.

8. *Colitis no longer to be considered a disease of nervous origin.*—In a recent edition, Osler speaks of "true mucous colitis as a secretion neurosis of the large intestine, met with, particularly, in nervous and hysterical patients. Sometimes there are attacks of nervous diarrhea."

Niemeyer, in 1911, said, "It is noticeable that the patient is almost always a nervous, hysterical or hypochondriacal individual. The noticeably frequent association of the disease with hysteria and neurasthenia, seems to indicate nervous causes for the exaggerated production of mucus. The course of the disease depends on the character of the food taken, and the other nervous symptoms present. The treatment is local and chiefly for the care of the associated neurasthenia."

We believe that modern developments have shown these statements to be absolutely the reverse of true. We believe that the bowel condition usually caused by ptosis of the organs is the primary condition, and that the nervous and mental symptoms are the result. When the enteroptosis is relieved the nervous and mental symptoms gradually disappear. In this connection it might be well to introduce the historic case of Sir William Treves, cited by Osler, as a case in which

laparotomy was resorted to as a medical measure with alleged perfect results. An extract from Allbutt's "System of Medicine," Edition of 1898, Volume III, written by Mr., now Sir, Frederick Treeves, follows:

An unmarried lady of thirty consulted me with what she was assured was a stricture of the colon. She had the persistent pain and a very marked tenderness at a spot just above and to the left of the umbilicus, to which I have just referred. The stricture was supposed to be situated at this spot. She had frequent vomiting, which appeared in attacks. The vomited matter was small in amount and usually intensely acid. Her bowels were confined, and she described her motions as containing many strange and wondrous things. An examination of one of these remarkable stools revealed nothing unusual, except much undigested food and much mucus. The patient was thin and pallid. She was too weak to follow any other engrossing pursuit, but she had made a great study of her malady. The abdominal pain had begun ten years previously, and since that time she had had manifold illnesses. She had writen out an account of these disorders with much care. They seem all to have been of an acute and exceptional character, and included malignant sore throat, internal abscess, spinal exhaustion, neuralgia, and certain smaller troubles. She had had uterine affections of bewildering complexity. She spoke of her kidneys with precision and of her liver with regret. The former organs were prone to unreasonable congestion, and the latter to an obstinacy which appears to have been little short of intelligent. She had been to many health resorts, and had taken medicine for the ten years concerned. She was certainly feeble, anemic, and intensely neurotic. The abdominal pain was, at times, agonizing; and her friends were driven to desperation by an illness which seemed unending and filled with tortures. The abdomen was flabby and revealed nothing beyond a general ptosis of the abdominal viscera of moderate degree.

The kidneys were both slightly movable. As all medical measures had failed, as the patient was leading the miserable life of a chronic invalid, and as her friends were becoming convinced that "she must have something wrong," I consented to make an abdominal exploration. I found a general prolapse of the viscera of moderate but distinct degree; the stomach was perhaps a little dilated, but beyond this every organ in the abdomen was perfectly normal. The intestine

was closely examined from the duodenum to the sigmoid flexure; it was perfectly normal.

The exploration cured the patient of all her abdominal symptoms, even of the vomiting, and of the pain which had troubled her for ten years. I think it possible that the ptosis of the mass of intestines may have hindered the passage of food from the stomach in a trifling degree.

This case, therefore, was one of uncomplicated visceroptosis with nervous phenomena in a very neurotic patient. Although the patient had never worn a belt, she was always worse when she moved about, and was only comfortable when in bed. A belt was worn after the operation.

Treves repeatedly refers to the mental effect of the operation. I look upon this case as a well-marked splanchnoptosis, and its cure not due to the operation at all, but to the rest in bed and appropriate bandaging afterwards.

9. *Rest in bed, forced feeding, posture, exercise, and proper bandaging.*—These will relieve nearly all such cases. Usually, the first treatment required for splanchnoptosis, is a six weeks' rest in bed. The foot of the bed should be raised twelve inches, more or less, depending on the case. A trained nurse should be in attendance to give proper baths and massage. Since these patients are inclined to melancholy, a cheerful, hopeful nurse is essential. Much of the emaciation is due to fear of eating perfectly harmless foods, and they must be urged to eat, even if it causes gastralgia. The stomach has been lazy and must be forced to work. At least five meals a day must be taken. It is usually not desirable to give purgatives. A sun-parlor or porch should be used if available, but the patient should be isolated from inquisitive friends or strangers. Complete mental and physical rest is necessary.

After a certain time the supporting bandage should be applied and the patient put on foot. The bandage known as the Comfort U, made for me by E. J. Fayart, of Springfield, Ill., is an improved form of the supporter devised by Dr. Gallant, of New York City.

It has certain advantages which need not be minutely detailed. Suffice it to say that it usually supplies the required support. To this must be added rest in a reclining position for a half hour after each meal, with clothing and bandage loosened, and the foot of the couch or bed elevated. In due time light gymnastics, directed especially to improving the tone of the abdominal muscles and diaphragm, may be taken. We advise shoulders on the floor and hips on a couch, hanging by the knees on a horizontal bar, golf playing, croquet, tennis, etc. Do not permit automobile riding until the cure is perfected.

10. *Lane's operation seldom necessary.*—Some fifteen years ago Metschnikoff pronounced the colon a useless portion of the intestinal tract. The truth of this statement has not been proved. Following this came the remarkable proposition of Arbuthnot Lane, to excise the greater part of the large bowel for all sorts of ailments. Fortunately, the profession did not hastily accept this dictum. It seems apparent now that it was too broad and sweeping. A few, but not many, patients should be subjected to the Lane operation. Careful attention to the early stages of splanchnoptosis will reduce these cases to the vanishing-point.

11. *Gastropexy, first advocated by Duret of Lille, and promoted by Rovsing, of Copenhagen.*—This operation offers in many cases a hope of relief. Having exhausted all other means of relief, and having proven by repeated studies with the bismuth meal and the radiograph that the ptosis exists, it is our duty to give the patient the benefit of the Duret-Rovsing operation.

Duret did a gastropexy in 1894. He reported his case to the Academy of Medicine, Paris, October 2, 1894. The patient was a woman of fifty-one, who was afflicted with enteroptosis, together with dilatation and dropping of the stomach to the subumbilical region. All medical treatment having failed, a gas-

tropexy was decided on. An exploration was made for a curable pyloric lesion, and, this being absent, the stomach itself was brought up and its anterior surface fixed to the abdominal wall. The incision was made through the skin and muscle from the ensiform process to the umbilicus. The peritoneum was only opened at the lower angle of the wound, and then fixed at the lesser curvature of the stomach to the untouched peritoneal surface, high up, with a single thread which led alternately in and out through the serosa covering the stomach and the parietal peritoneum. As a result of this simple procedure the stomach and intestinal functions were regulated, and the patient increased notably in weight. The stomach-splashing disappeared below the umbilicus, which proved that the fixation was complete. No *x*-ray was available at this date. Some neurasthenic symptoms remained for a time, but later entirely disappeared. This observation showed that old cases of stomach-prolapse could be greatly benefited by a simple operation, and the majority of the distressing symptoms would disappear. At a later session of the Academy (March 19, 1895), Professor Le Dentu reviewed the paper. Le Dentu expressed the opinion that fixation of a hollow organ, like the stomach or intestine, would have no influence on the symptoms, immediate or remote, depending on the mobility or ptosis of the organ. Besides, gastroptosis rarely exists alone, but is accompanied with enteroptosis, gastric ectasia, etc. In these cases gastropexy is evidently insufficient.

Again he said: "The operation is open to two other objections. The first is, that, in fastening the pyloric end of the stomach in the epigastric region, we force the organ to bend itself, the median section not being brought back to the same level as the two tuberosities. The second objection is, that the formation of adhesions between the stomach and the abdominal wall is

not without inconvenience, therefore the operation only presents serious chances of success when the stomach is simply displaced. Even then it is doubtful if the operation will become popular."

It will be seen that the Duret operation was damned by faint praise, and, in effect, was killed where and when it should have been given serious consideration, for the patient was cured and lived many years in comfort. It remained for Professor Rovsing, of Copenhagen, to develop and extend the operation and prove to the profession that, contrary to any preconceived opinion, it should be given a trial. Rovsing has shown that in Denmark more than 256 gastropexies have been done up to 1911, and that cure, or great improvement, has been obtained in from 70 to 75 per cent, improvement in 10 to 12 per cent, no change in 11 to 12 per cent, and deaths in 3 to 5 per cent. These percentages are in round numbers.

Description of the operation: The usual incision for the stomach operation should be made, and should at least extend from the tip of the ensiform cartilage to the region of the umbilicus. The whole abdomen should be explored at once. The appendix should be removed if found diseased; the gall-bladder emptied of stones if any are present, and excised if necessary; adhesions in any part should be examined, and eliminated if causing kinking or compression; the liver, if prolapsed, should be fixed by sutures to the peritoneal covering of the diaphragm or the ligamentum teres should be severed and stitched to the diaphragm. Usually, the transverse colon must be brought into position by passing several sutures first through the serous coating of the colon, then in and out through the layers of the gastrocolic ligament, and finally through the serosa of the stomach along the greater curvature.

In doing this be careful to avoid the blood-vessels

of the omentum. This brings the colon up close to the stomach. We are now ready to attach the stomach to the abdominal wall. I now give the peritoneum of the stomach and of the abdominal wall a good rubbing with dry gauze to cause roughness and exudation. Rovsing advises scratching these surfaces with a needle. Three heavy silk sutures are passed in and out through the serosa, each thread parallel with the axis of the stomach (see illustration). These threads are about three-quarters of an inch apart; one just under the lesser curvature, one three-quarters of an inch below this, and one one inch and a quarter above the greater curvature. The ends of the threads are passed entirely through the abdominal wall, at a distance of about an inch and a half from the median line. The wound is closed in the usual manner; a glass plate about three by four inches in size, wrapped in sterile gauze, is clapped on the abdomen, and over this the stitches are tied. This, of course, is done to bring a broad flat surface of stomach against a similar surface of the abdominal wall. These threads remain undisturbed for four weeks or until complete convalescence has taken place.

CASE-HISTORIES

Case 1.—The patient was successfully treated by advice, posture, and treatment of ethmoid sinusitis. Mrs. Dr. C., housewife, of Rochester, Ill. Parents living in good health. One sister living in good health. Age 35 years. Married. No children. First saw her on February 14, 1908. Had typhoid fever in 1895; very mild attack. Bowels constipated. Menses regular. First noticed particular stomach trouble some months ago. Has had numerous attacks of indigestion, which lasted ten to twelve days. There was no regularity about these. Her husband would give her medicine, but the attacks would recur. Average weight, 150; present weight, 115. No fever with attacks. No kidney trouble. No vomiting. Seems to be extreme burning in throat and stomach, which would last four hours and sometimes much longer. If she starves seems

to be better. Thinks she has fallen off, because she eats nothing.

Examination shows no tenderness over the gall-bladder or in the appendiceal region. Prolapse of the stomach is well marked. No floating kidney. Teeth good. Tongue in fair condition. Patient states she hurries to remove dishes from the table so that the dining-room would look well when patients visited the Doctor. Also at meal-time she would answer telephone in order that the doctor might eat without interruption. She eats rapidly. Advise that she stop answering the telephone at meals. Let husband attend to this, as he is sturdy and strong. That she cover the dining-table with a clean cloth, and lie down after meals for a half hour with hot water bag to epigastric region. Gave diet February 21. Thirty days later she reports she has had no burning of the stomach whatever. What she has eaten seems to agree with her. Has excellent appetite. Has gained in flesh. Bowels not so constipated. Nervousness better. Tongue is very clean. Now, 1917, nearly ten years after this advice was given, she tells me that her health has been excellent and she weighs 125 pounds. Health perfect except for occasional rheumatism.

Later ethmoidal sinusitis was discovered, and treated with excellent results.

Case 2.—Gastroptosis successfully treated by posture and bandage. Paul G., aged 18, student, of Springfield, Ill. He began to show signs of failure in strength and flesh, presumably as a result of over-work at school. This was not relieved by a change of climate, but emaciation progressed until his weight became 107 or less. Thorough examination shows negative Wassermann. No tuberculosis. Heart weak. Tonsils diseased. Stomach low down in pelvis so that the stomach, filled with bismuth milk, could be felt with the finger through the rectum. The tonsils were removed under local anesthesia. The patient was put to bed for ten days with the foot of the bed elevated sixteen inches. A corset was applied to hold up the stomach, which was only partly effective because of the extreme emaciation. About this time an article appeared in the *New York Medical Journal* showing a bandage designed by Dr. A. E. Gallant, of New York City, and one of these was fitted to this patient. Proper exercise was prescribed to improve the abdominal muscles, and after four months the patient was allowed to resume his studies. The case has progressed favorably, and the patient's present weight is 143 pounds.

Recent fluoroscopic examination shows the stomach at least six inches out of the pelvis. The abdominal muscles are strong, and indications are that a cure has resulted. I can highly recommend the Gallant bandage where an operation has been performed and where an attempt is made to elevate the stomach without an operation. I have prescribed at least one hundred of these, and I think some seven hundred have been prescribed in Central Illinois. A large number of patients have been benefited by this simple appliance. They are cheap, cleanly, have no rubber elastic to wear out, and in all particulars have proven satisfactory. An improved bandage is made by E. T. Fayart, 530 South Fifth St., Springfield, Ill.

CASE 3.—Long standing stomach ailment due to gastroptosis successfully treated by direct Duret-Rovsing separation. Mrs. Theodore D., housewife, of Springfield, Ill., aged 44; married; height 65 inches; weight 118 pounds; has weighed 145. Father died of typhoid, aged 30. Mother living in fair health. One brother living and healthy. Husband is living and in fair health. Three living healthy children. One infant died of erysipelas. No evidence of disease in mouth or air-passages.

She says her abdominal symptoms date from the time when she clerked in a retail furniture store twenty years ago. Her hours of work were long; there was little time for meals; and she hurried back after eating, taking absolutely no rest after eating. She has had chronic constipation for years. She has taken a great deal of medicine for years, and lately has been confined to bed nearly all the time. Has had many spells of a hysterical nature, and has felt she would die, and has had a fear of falling all the time. She refused to go to the hospital for treatment. Her stomach has been washed out daily for two weeks without relief. She entered St. John's Hospital June 13, 1917. Fluoroscopic examination shows the lower border of the stomach resting on the pelvic pan. The radiograph shows the characteristic stocking-shaped stomach.

Urine, 1.010, normal except a trace of indol; Wassermann, xx; blood, hemoglobin, 84; reds, 5,100,000; whites, 7,800; diff., 64 and 36. She was given four intravenous injections of salvarsan, total amount 0.90, and four deep injections of salicylate of mercury, total 40 minims; and was given also two teaspoonfuls of mist. rhei et sodæ in hot water before meals. No relief from vomiting, which was of daily occurrence. Finally she was deprived of all nourishment by the mouth, and given rectal feeding only. Vomiting began again after

a few days. Her weight was reduced to 96 pounds, and the outlook was quite unfavorable.

A Rovsing operation was done, July 24, Dr. Kelly assisting. An incision was made from the sternum nearly to the pubes. Marked prolapse of the liver was found, marked adhesions about the gall-bladder, and marked enlargement and prolapse of the stomach and colon. There was no disease of the gall-bladder or of appendix. Other organs appeared normal, and there was no apparent ulceration or disease of the stomach. Under these circumstances it was decided to break up all the old adhesions, and to anchor the stomach in its normal position as well as possible by the Rovsing method. The anterior surface of the stomach and the peritoneum of the abdominal wall was rubbed. Two of these complete sutures through the abdominal wall were inserted. The ascending colon by stitches through the abdominal wall was anchored in nearly the normal position. Another suture was placed about the middle of the transverse colon. A third suture was not placed in the pyloric region of the stomach because of the prolapsed liver. The patient left the table in good condition.

Vomiting began again the third day after operation, and was so violent that the lower part of the incision was opened. Owing to the critical condition of the patient the small intestine, which had prolapsed through the wound, was merely pushed back, and the wound drawn together with adhesive strapping and allowed to heal by granulation. Undoubtedly, there is a considerable adhesion at this point. She left the hospital September 16, about seven weeks after the operation. Her recovery has been slow, but steady, and she now weighs 130 pounds, a gain of 35 pounds. Her bowels move each day without a cathartic. She has an excellent appetite. She declares herself entirely well, and seems to be.

The patient was interviewed on May 20, 1918, and seems well in every way except for occasional nervousness.

Case 4.—Long standing stomach ailment due to gastroptosis successfully treated by Duret-Rovsing operation. Miss Hattie H., aged 49, housewife, of Waverly, Ill., weight, 94 pounds; entered hospital October 15, 1917. Family history rather negative. Father died of kidney disease at age of 70; mother died of heart disease at age of 63. One brother died of tuberculosis; one brother suicide at age of 37; one brother died a soldier in the Philippine Islands; one sister died in childbirth; one sister living at 27 is very nervous; four brothers are living in fair health.

She has had stomach trouble for thirty years. More particularly has suffered in the last six or eight years. Always had pains after meals. The last three weeks has only taken egg-water and ice-cream. A prominent physician in a neighboring city thought she had gall-bladder trouble, and treated her for about one year.

On entrance she was so weak that it was necessary to have a sister support her on each side to get a fluoroscopic examination of the stomach. Examination resulted as follows: Wassermann, negative.

Urine: Sp. gr., 1.030; acid; otherwise negative. Blood: 66, 29, 4, 1; reds, 4,040,000; whites, 6,600; hemoglobin, 80. Feces: no blood; no ova; no tuberculosis; no parasites. Stomach contents: mucus on top; micro. negative; food, well digested. free hydrochloric, 25; organic, 18; total acid, 55; comp. hydro. 15.

Fluoroscopic examination shows as follows: A ragged outline of the stomach, which fails to empty after seven hours. The bowels are much distended with gas. There is also an infiltration in the lower left quadrant of the stomach which is associated with the infiltrated liver. The heart is somewhat atrophied. The stomach shows a very large amount of gas. The lower border extends down to two inches below the crest of the ilium. There seems to be considerable fixation of the tissues of the abdomen. There appeared to be a large amount of fluid in the stomach besides the fluid ingested with the meal.

All conditions being considered it was thought best to suggest an operation, which was agreed to on the theory that death was better than a continuance of life under the present conditions.

Operation was performed November 3, 1917. An incision was made from the sternum to below the umbilicus. The liver seemed prolapsed. The gall-bladder was examined and found empty. The appendix seemed distended, and was removed. The transverse collapsed colon was sewed to the lower border of the stomach. Three sutures were placed according to Rovsing. The liver was displaced downward and would have been attached to the diaphragm had not the patient shown symptoms of collapse. The wound was brought together, and linen threads (not too heavy) were tied over the glass plate. Two small fibroid growths on the uterus were not removed. The ligatures through the stomach were removed at the end of 23 days.

The patient made a good recovery, and left the hospital at the end of eight weeks. Her deafness is a considerable handicap to her happiness; but she is reported doing well, and she is doing a great deal of knitting. She has gained fourteen pounds in weight.

REFERENCES

1. Note that the date of Glenard's first publication is 1881, not 1883, as usually given.
2. La Semaine méd., 1886.
3. Berlin K. W., 1909-1905-1899.

DISCUSSION

Dr. Clifford U. Collins (Peoria, Ill.): This class of cases is a problem to me. The *x*-ray examination reveals prolapse of the stomach, and I have never had the temerity to do very much in fastening the stomach up. I had a talk with Dr. Kreider a few months ago when I had a patient whose stomach was down in the pelvis. She was very much emaciated, and showed the clinical picture that these patients usually present. A diseased gall-bladder was removed, and we did a Rovsing operation. The result was excellent. The patient began to gain in weight. The symptoms have disappeared, and she has had no discomfort resulting from the operation. How much of the favorable result was due to removal of the gall-bladder and to the fastening of the stomach, I do not know. I tried it at the suggestion of Dr. Kreider, and, as I have said, the result has been good.

Dr. E. M. Sala (Rock Island, Ill.): I would like to mention a little bandage in this connection which I have found very useful, and it is so simple that it is worth trying. You take three yards of cheese-cloth or gauze, and, if it is twenty-four inches wide, you fold it once, which makes it twelve inches wide; then roll it up from both ends to the middle; then, with the patient standing, take the two rolls, one in each hand, starting in front, go around to the back, changing rolls to opposite hands, then cross over, go around to the front, cross over, and fasten in the back with safety-pins. This has proven the most comfortable abdominal binder I have ever used.

Dr. J. N. Warren (Sioux City, Iowa): The subject of gastroptosis is one that has attracted the attention of every surgeon, as well as the internal medicine man. The first

method that we had in this country for the relief of gastroptosis was Coffey's operation before Rovsing's operation was described. I have tried both of these operations. In the Rovsing operation, of which the doctor speaks, when a prolapse of the liver appears, the operation for fixation of the liver, so that all three stitches can be put in, is easily accomplished. While my patients have been benefited, none of them have been cured. The one method that has given me the best results is the plan of introduction of the sutures. Recently we have been taught and it has been demonstrated that the stomach does not lie across the abdominal cavity, but it is more vertical. Three of my cases have been a variety of Rovsing's fish-hook, and they are the most troublesome and the most difficult to anchor. If we make an incision at this point (indicating), we shall find invariably that the liver is prolapsed, and unless we correct or care for the liver, our operation is likely to be of no great benefit to that patient. Where the liver presses against the pyloric end of the stomach you have mechanical force favoring the re-development—you have cause for failure or fixation of the stomach to the abdominal wall. This is easily accomplished. In all these cases the edge of the liver is comparatively hard, and you can pass sutures through the end of the liver and through the peritoneum and fascia under the muscles on the inside and anchor the liver up, and unless you do this you will get very little benefit from the operation. In the last Rovsing operation I did, instead of passing the suture across the abdominal cavity at this point (indicating) and bringing it out and putting it over the wall, I began higher up, and ran it obliquely downward, and commenced anchoring the cardiac end of the stomach higher up so that now I have a vertical position of the stomach. This operation has given me more satisfaction than any other method I have used.

Dr. Emil G. Beck (Chicago, Ill.): The usual objection to the Rovsing operation is that it does not remedy the entire trouble. It is not the stomach alone that is prolapsed, but practically all the viscera are low down in the abdomen, and that accounts for the fact that a great many surgeons, however, practiced this operation. My brother (Dr. Carl Beck) has two cases on record, one of which was operated on at the time Dr. Rovsing was in Chicago, and both of these cases have been so markedly benefited that they may be called cured.

The logic of the fault-finder in these cases is this: Since the intestines, as well as the stomach, are low, a correction of

the position of the stomach will do no good. This is faulty reasoning. An *x*-ray picture of a prolapsed stomach will show that food is retained sometimes from twelve to fourteen hours, and the weight of the food in the stomach drags it down. Most of the symptoms are due to the retention of the food. Therefore, if you correct this one fault, you obviate a good many of the symptoms. If the stomach is stitched high up and kept high, the pylorus, which is often very low (I have seen it away down in the pelvis), will be relatively replaced in its normal position and have the tendency to elevate the rest of the abdominal viscera. I believe that the operation of Rovsing should be taken up again to determine how much merit there is in it. If properly performed, I believe it will be of great benefit.

Dr. Kreider (closing): I am much obliged for this interesting discussion. Dr. Warren says that some of his cases have not done well after the Rovsing operation. In addition to this operation, these patients must be instructed in regard to changing their mode of living. If you instruct them how to live, and they follow your advice, very soon you get them in such an excellent physical condition that you do not need any support for the abdominal contents. The operation gives them the basis, and probably as much importance should be attached to the manner of living as the fixation of the abdominal contents.

In the first case reported we had quite a prolapse of the liver, and we could not put in the very stitch we thought of putting in because we were afraid of kinking the stomach by the dropping of the liver, so that we only put in two stitches. That has been the oldest and best case I have had.

I have had *x*-ray pictures of both of these cases since operation, and they show the stomach in good position. I did not have time to find out what had become of the adhesion of the small bowel to the abdominal wall. So far as the present indications are concerned, the woman whose case I have described is in good health and has had absolutely no bad symptoms from this adhesion.

SOME TUMORS OF THE NECK

EARLE R. HARE, M.D., F.A.C.S.

MINNEAPOLIS

There is no other area in the body so frequently invaded by tumors as the neck. This fact is largely explained on anatomical grounds. In the very early embryonic life, four grooves appear in the ectoderm of the head end, and, a little later, four corresponding outpouchings develop in the pharyngeal entoderm directly opposite them. The ectoderm and the entoderm approach each other, and fuse, forming a thin plate, which normally remains intact, and so separates the pharyngeal pouch from the external surface. These grooves are spoken of as the *branchial grooves;* and the pouches as the *pharyngeal pouches* or *grooves.*

On either side of each groove is a thickened mass of mesodermal tissue, which separates them, and contains nerves and blood-vessels. These are the branchial or visceral arches, and are five or six in number. They are designated the *mandibular,* the *hyoid,* and the *branchial arches* proper, I, II, and III. From them, many of the important structures of the face and neck develop. The first cleft is known as the *hyomandibular.* The tympanic cavity develops in relation to the first pharyngeal pouch; the palatine tonsil and sinus tonsillaris, in relation to the second; and the ductless glands, the thymus, and the parathyroids, and the lateral thyroids, in relation to the third, fourth, and fifth.

The thyroid vesicle develops in the median line near the base of the tongue, and connects with a hollow stalk, which becomes obliterated normally in embryos of 5 mm. When the hollow stalk fails to close, it remains as the thyroglossal duct, and it passes from the foramen cecum, at the base of the tongue, downward and forward, crossing, or piercing the hyoid bone to the thyrohyoid membrane. The ductus branchialis is the duct-like remains of the second external branchial groove, and it is obliterated normally in embryos of 9 mm.

The presence of a large number of lymph-nodes, and the two failures of development in the region of the visceral arches, account for most of the tumors of the neck. There are many important structures in this region, but their unusual accessibility greatly facilitates the treatment of pathological conditions.

The tumors to be discussed fall into two general classes,—namely, (1) primary and (2) secondary. Among the primary tumors mentioned are (a) Hodgkin's disease (lymphoblastoma), (b) carcinoma of the skin, (c) branchiogenic carcinoma; and among the secondary tumors are (a) carcinoma of the lymph-nodes, (b) tuberculous lymphadenitis, (c) thyroglossal cysts, (d) branchiogenic cysts, (e) lipomata, (f) sebaceous cysts, and (g) fibromata.

Hodgkin's disease involves usually the glands of the neck, first on one side, and then on the other, and spreads progressively to other groups of lymph-nodes. (See Figs. 1 and 2.) The enlargement of the glands is essentially chronic. There is much discussion as to etiology, some investigators insisting that it is the result of direct bacterial invasion. Mallory states that it is most often a lymphoblastoma of the slowly growing scirrhous type.

The condition may be easily confused with a tuberculous process, and the diagnosis is most surely made

by microscopic examination of the involved glands. (See Figs. 3 and 4.) Some credence may be given the bacterial theory, when we contemplate the marked temporary relief seen in one reported case, accidentally infected with streptococcus erysipelatus, and a second remission of all symptoms, following a second similar treatment; but this patient finally died, following a third involvement and a failure to respond to the same type of treatment previously given.

A personal observation may be of interest. Mrs. F., aged 60, who had previously suffered from tic douloureux, involving the mandibular branch of the 5th nerve, and completely relieved by resection of the offending nerve, presented herself with greatly enlarged cervical lymph-nodes of ten weeks' duration. The enlargement began on the left side, and more recently appeared on the right. There are now some pain and a mild degree of temperature. Microscopic examination of the involved nodes gives a typical picture of Hodgkin's disease; no growth from cultures. However, marked improvement followed immediately after the administration of a mixed bacterin. The improvement continued over a period of several months, but the patient later died of a recurrence.

Carcinoma of the skin of the neck is of infrequent occurrence. When present the tumor partakes of the usual characteristics of carcinoma, and is very hard, nodular, and superficial, and should be easily diagnosed.

Branchiogenic carcinoma develops from the epithelium of the walls of a branchiogenic cyst, and presents a difficult problem in diagnosis. The tumor arises in relation to the second branchial cleft, and lies just below the mandible and anterior to the sternocleidomastoid muscle. The tumor is hard and frequently accompanied by pain. It must be diagnosed from:

Lymphosarcoma, tuberculous lymphoma, congenital serous cyst, and actinomycosis.

This tumor should be recognized early, and treated radically, for the condition is a most serious one, accompanied by a very high mortality. McKentry reports 100 per cent in five cases at the Royal Victoria Hospital, covering a period of fifteen years.

Primary growths in the glands of the neck are rare, but secondary growths are frequent. Lymphogenous lymphadenitis occurs through the afferent lymph-vessels. It is the most frequent type of involvement, and is usually localized. Hematogenous lymphadenitis occurs through the blood-stream, is usually general, and is of infrequent occurrence.

Secondary carcinoma of the lymph-nodes usually follows malignancy in the floor of the mouth or the lip, and partakes of the usual characteristics of such involvement. The diagnosis should not be difficult after careful examination and locating the primary lesion elsewhere.

Tuberculosis of the lymph-nodes of the neck is second only in frequency to pulmonary involvement. (See Figs. 5 and 6.) The atrium of infection usually is found in the mouth. The mucous membrane or the lymphoid tissues receive the bacteria, and pass them along to the lymph-nodes, where multiple miliary tubercles develop, resulting in the destruction of that node and a further involvement of contiguous nodes.

This picture is so familiar that you recognize it at once; still the diagnosis of this condition is not always easy. Involvement of the submental glands may simulate a thyroglossal or a dermoid cyst; or enlargement of the submaxillary nodes may be mistaken for a branchiogenic cyst or a carotid tumor. Consequently, where an isolated group of nodes is involved in a slowly developing process, a most painstaking study may be required to reach a correct diagnosis.

The treatment of this condition involves a wide divergence of opinion. In so much as the area is accessible, and the condition considered local, complete excision, together with the usual hygienic treatment, seems to be the most rational. Decided benefit is seen in the use of minimal doses of tuberculin preceding and following excision.

The consideration of thyroglossal and branchiogenic cysts is very interesting. Failure of development in early embryonic life is responsible for both thyroglossal and branchiogenic cysts and fistulæ. A thyroglossal cyst first appears as a small, rounded tumor in midline between the larynx and the hyoid bone. It is of slow development, and the patient may be entirely free from distressing symptoms for a long period of time. As the tumor increases there are gradually increasing hoarseness and dyspnea, due to pressure on the supralaryngeal tissues. It is quite possible in most cases to dissect out the tumor entirely, but, where the duct remains open in its entire length, the dissection leads upward across or through the hyoid bone to the obliterated foramen cecum at the base of the tongue, and presents real difficulties. (See Figs. 7, 8, and 9.)

The diagnosis is not always simple. The condition may be confused with a dermoid or an aberrant thyroid. All of these tumors enlarge slowly, and they cause some difficulty in deglutition. There may be a dry, irritative cough, a gradual impairment of the voice, an absence of pain and no attachment to the overlying integument. Should the aberrant thyroid become cystic, the diagnosis may remain speculative till the time of removal.

Branchiogenic cysts are likewise of slow development. They may appear very soon after birth, or not for many years. These cysts develop in relation to the second branchial cleft, and are present when the

ductus branchialis fails to close. The inner end of the duct is near the sinus tonsillaris, and it passes outward across the posterior belly of the digastric, between the internal and external carotid arteries, across the great cornu of the hyoid bone to a point immediately beneath the deep fascia, platysma, and integument.

The slow dilatation of this duct results in the formation of a cyst, which appears immediately beneath the margin of the mandible, anterior to the sternocleidomastoid muscle.

These tumors are essentially congenital, though they may not appear for many years. They present two real problems: first, diagnosis; second, removal. They may cause very slight inconvenience for a long time, the chief disturbance arising from pressure as the tumor enlarges.

The diagnosis is of interest. Differentiation must be made from—

1. Retention cysts, due to closure of Wharton's duct.
2. Lymphangiomas.
3. Thyroid cysts.
4. Sebaceous cysts.
5. Lipomata.
6. Tuberculous glands.
7. Abscesses, deep lying and slowly developing.

The position of the branchiogenic cysts is rather constant and characteristic. They are not attached to the overlying skin, but are firmly attached on the mesial side. They are semi-fluctuating and freely movable beneath the skin, and, owing to their deep attachment, cause a distinct tugging on the tonsil when outward and downward traction is made.

In lymphangiomas the walls are less tense; thyroid cysts usually lie more distal and more beneath the sternomastoid muscle; the sebaceous cysts have a defi-

Fig. 1. Hodgkin's disease, showing enlarged cervical lymph-nodes, both right and left.

Fig. 2. Hodgkin's disease subsequent to treatment.

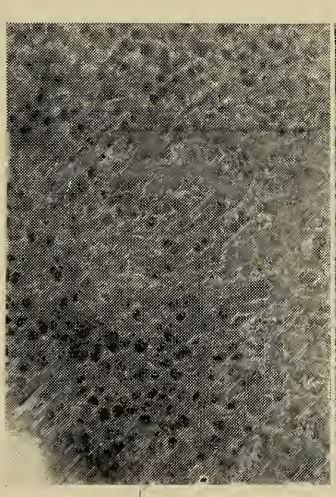

Fig. 3. Photomicrograph, Hodgkin's disease showing characteristic cells of the lymphblast type. Reticulum well marked.

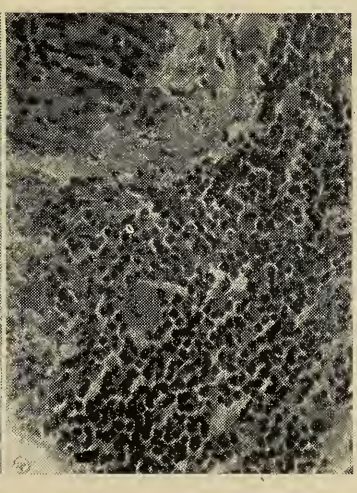

Fig. 4. Photomicrograph. Tuberculous lymphadenitis.

Fig. 5. Tuberculous lymphadenitis. Extensive involvement.

Fig. 6. Tuberculous lymphadenitis. Well localized, simulating branchiogenic cyst or carotid tumor.

Fig. 7. Branchiogenic cyst at the angle of the mandible and anterior margin of the sternomastoid.

Fig. 8. Branchiogenic cyst.

Fig. 9. Thyroglossal cyst overlying thyroid cartilage.

Fig. 10. Fibroma durum. Recurrent, showing enlargement on the left side of the neck with slight torticollis.

Fig. 11. Fibroma durum. Tumor enlarged; torticollis more marked.

Fig. 12. Fibroma durum. Tumor enlarged; lateral deviation of trachea and esophagus.

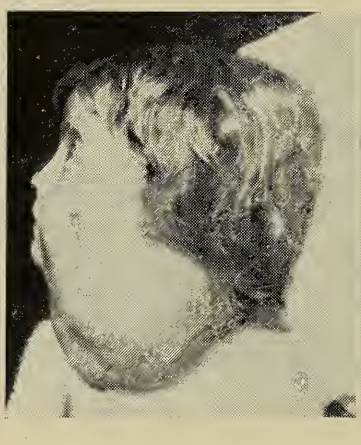

Fig. 13. Fibroma durum. Tumor at maximum; marked deviation of trachea and esophagus; some emaciation.

Fig. 14. Fibroma durum. Tumor has entirely disappeared.

nite attachment to the skin; the lipomata are lobulated and without deep attachment; tuberculous glands usually are more firm, and accompanied by perilymphadenitis; the presence of pus in abscesses may be shown by aspiration.

The treatment is entirely surgical, and consists in complete removal. Owing to the course of the branchial duct, the dissection must be carefully made in order to avoid injury to deep-lying and important structures. In some cases it becomes necessary to complete the removal of the duct through the mouth.

The diagnosis of sebaceous cysts and lipomata will offer but little difficulty if the almost constant attachment to the overlying integument of the first and the lobulated condition of the second, be remembered. (See Figs. 10 to 14.)

Fibromata are rare, and mention of them is made in order that the following most interesting and unusual case may be cited:

CONCLUSION

A little girl, aged 6 months, American, was presented at the clinic. She had what appeared to be a typical branchiogenic cyst of the left side. After careful examination the tumor was so diagnosed. It had appeared when the child was but a few weeks old. Owing to the extensive dissection required for its removal, and the absence of distressing symptoms, expectant treatment was advised. Six months later the child was again presented at the clinic, the diagnosis confirmed by a confrere who advised operation. The operation was, of necessity, incomplete, owing to the extent of the tumor, and the posterior capsule was left. The microscopic examination showed a typical fibroma durum, an essentially benign tumor.

There was an immediate recurrence of a rapidly growing tumor, which was now more firm than before. The diagnosis was now sarcoma, and a lethal prognosis given. The tumor grew to enormous size, at first displacing the trachea and esophagus two inches or more to the right. Starvation seemed imminent owing to pressure, dysphagia, and

dyspnea. The tumor then grew across the trachea, and equalized the pressure sufficiently to permit of improvement in breathing and swallowing. At this most critical stage, the little patient suffered a severe attack of measles. A marked hemorrhage occurred into the tumor. It softened in several areas, and from that time began to decrease in size. The tumor gradually disappeared and with it the symptoms. One year ago a staphylococcic abscess appeared in the same side of the neck in the supraclavicular triangle. The abscess was drained, and promptly closed; and today the child is in perfect health, with nothing but a slight torticollis to remind one of her former trouble.

First—Careful, painstaking study of these cases will usually lead to a correct diagnosis.

Second—The same care exercised in the treatment will usually result in a cure.

DISCUSSION

Dr. Emil G. Beck (Chicago, Ill.): I want to say a word or two about the diagnosis of Hodgkin's disease. In these cases we find that very often there are additional tumors in the chest, and, therefore, we take röntgenograms of the chest in all such cases. Furthermore, we ought to find the diphtheroid bacillus in true Hodgkin's disease. It may not be found for the first time. In the cases I have seen, we have found it.

We now rarely operate on tuberculous glands of the neck. In most cases they originate from the tonsils, and we have found that after removing the tonsils these tumors have disappeared without operation in a great many instances. Following the removal of the tonsils we have used to a great extent "deep therapy," and have found it of great advantage. Those who do not believe in deep therapy have not tried it. The literature furnishes us with enough evidence of its value from reliable clinics, especially from Switzerland. We have not operated in these cases for years, and have gotten the most satisfactory results.

I wish to mention a peculiar incident in one case of my brother, Dr. Joseph Beck. He was called to the Michael Reese Hospital one day to see a case in consultation. The patient, a woman, had a large tumor in the neck and also diseased tonsils. The surgeons wanted to know if the

tonsils were responsible for the tumor in the neck. The telephone operator who took the message, through a misunderstanding, said that my brother should come prepared to operate on the patient. The two surgeons not being present when he arrived, he ordered the patient to the operating-room, an anesthetic was given, and he removed the tonsils without the surgeons' knowledge. They were at first horrified, and very much alarmed; but later they were very much satisfied because the tumor in the neck had gradually but entirely disappeared.

In the case which Dr. Hare related, where the tumor disappeared after measles, the case was undoubtedly one of infection. If it was sarcoma it is not absolutely known to be non-infectious. It is known that one infection may kill another infection. This was demonstrated to me last summer when a man with malarial fever, which had persisted for years, was so sick of himself that he decided to commit suicide. I had him under my care in the hospital for two or three weeks, and then he went into another hospital for several weeks. When he found that he could not be cured, one day last summer he attempted suicide by gas-poisoning. I was called two hours after it happened, and his condition was so precarious that I did not think he would recover. He was very cyanotic and had pulmonary edema. We put him on a porch in the sunlight, and, as I learned later, he recovered consciousness in twelve hours. After four weeks later I saw his wife, and asked her about her husband, thinking that he had died; and she said, "He is fine." I sent for him, and found him in a perfectly healthy condition; he had gained twenty pounds in weight.

Is it possible that gas-poisoning may be a cure for malarial fever? (Laughter.)

Dr. E. S. Judd (Rochester, Minn.): Dr. Hare has called our attention to a difficult lot of cases to treat. There are one or two points about thyroglossal-duct cysts that I would like to mention. We have had great difficulty in curing these cases, and undoubtedly that has been the experience of other surgeons. A few of the patients we have operated on had been operated on by others several times previously. Dr. Seelig has suggested that the hyoid bone in developing after the thyroglossal duct may include the duct in it. In the cases in which the duct seems to be closely associated with the hyoid bone we resect a

small piece of the bone with the duct. We are curing more patients now than we did formerly. Seelig mentions that the thyroglossal duct has diverticula branching out from the side of it, and the mere removal of the duct itself leaves a small diverticulum on one side or the other, and recurrence takes place. The dissection in these cases should include more than the duct itself. The fascia and all the tissue in between the muscles should be removed.

We have been impressed in the last few years with the fact of seeing fewer cases of tuberculous glands of the neck as compared with some years ago, and the only explanation we think is to be found in the much more thorough prophylactic treatment,—attention to the tonsils, better hygienic treatment, and so on. Formerly, we operated in a number of cases of tuberculous glands of the neck every week, but now we rarely see one.

I have recently operated on one of the largest fibromas of the neck I have ever seen. The patient was a man, aged 50, who had had this tumor for ten years, during which time it had gradually increased in size. He had a tracheotomy done two or three years ago. He was hardly able to breathe, and the operation was done as an emergency procedure. The only way he could get food down the esophagus was to crowd it down with the finger. The tumor was encapsulated, and was removed quite easily. He was able to swallow immediately after the tumor was removed. The operation was made through an incision in the neck without opening the pharynx, and the stenosis of the trachea was entirely relieved.

Dr. Hare (closing): I mentioned the fact that there is considerable controversy with reference to the etiology of Hodgkin's disease. It looks as thought it might be a definite infectious disease. I think the work of Bunting and Yates has come nearer proving the definite infectiousness of the disease than the work of anybody else with which I am familiar or have seen. I do not believe that the tumor in the little girl was an infection. Why? Her temperature and pulse were always normal. There was no evidence of local inflammation, and with a tumor of the size that she presented, if it were due to an infection of ever so low a grade, it would, at the same time, furnish evidence of a localized infection, and that was not present.

With reference to the point made by Dr. Judd concerning the difficult removal of thyroglossal cysts: I did not

mention in my paper the fact which is well known and noted in the literature, namely, in many instances the thyroglossal duct penetrates the body of the hyoid bone, which must be explained by the fact that the hyoid bone develops around the thyroglossal duct. In these cases it has been found necessary, in order to cure the condition, to either resect a portion of the hyoid bone or, as one surgeon has advised, splitting the bone, gouging out the cyst, and then closure of the bone. Of course, if the duct passes over the bone, there is no necessity for resection of it, but in the cases where it passes through there will be recurrence unless every particle of the epithelial lining of the duct is removed.

DERMOID CYST OF THE INGUINAL CANAL IN A MAN

D. C. Brockman, M. D., F. A. C. S.

OTTUMWA, IOWA

November 21, 1913, Mr. B., of Missoula, Montana, aged 42, and his son, aged 12, entered the hospital for hernia operations.

The boy had a double oblique inguinal hernia with a right undescended testicle. His history is unimportant. The testicle was easily replaced and fastened to the bottom of the scrotum. A typical Bassini operation was done on the left side, and a Ferguson on the right.

The father had had hernia from his youth, and for several years had a tumor of very slow growth in the inguinal canal. At the time of operation this tumor was about the size of a hen's egg, the hernia slipping down by the side of it. He had worn a truss practically all his life. At the time he came under my care he was wearing a truss pad, excavated to fit over the tumor. The tumor felt like a thick wall cyst, and was irreducible. My opinion before operation was that we had a piece of incarcerated omentum containing the cyst. On cutting down on the tumor we found it inside of the sack rather firmly adherent to the canal. It was readily dissected out, and the hernia cured by a typical Bassini.

On opening the tumor we were very much surprised to find it filled with sebaceous material with a large

bunch of hair, which sprung from a patch of skin one and one-half by two inches in dimension.

Here we have a paradox, indicating a condition that could not possibly exist. Dermoids are never found except in or near the median line, but, if we recall the embryology of the descent of the testicle, the paradox is cleared up very readily.

Dermoid of the testicle is not an infrequent condition, and in this locality the dermoid is not incorporated in the organ, as it is when existing in the ovary, but we find that in many of the dermoids of the testicle the tumor can be very easily separated from its adhesion to the organ. By recalling these facts it is very easy to see that as the testicle is drawn through the inguinal canal it could be very easily pulled away from this attachment and remain in the canal.

This is, without doubt, the explanation of one of the rarest anomalies in surgery. As a result of extensive investigation I have been able to find records of only four cases of well-defined dermoids in the inguinal canal, although I find several cases of simple cysts of different kinds in that location. As you well know, dermoids of the testicle are rather infrequent. I have found only two of them in forty years practice, while during that time I have removed probably twenty-five ovarian dermoids.

I append a brief résumé of the following four cases gathered from the literature up to date:

No. 1. Waiss, G. C.: Dermoids of the inguinal region. Surg. Gynec. & Obst., Chicago, vi, 350-353, 1908.

The author draws attention to the extreme rarity of dermoid tumors in the inguinal region. He reports a case in a man aged 37, which, although not a hernia, simulated this condition. There was a probable diagnosis of cyst; and operation disclosed a dermoid cyst (histologically confirmed) adherent to the anterior surface of pubic bone.

No. 2. Paterson, H. J.: Dermoid cyst of the inguinal canal. Trans. Path. Soc., London, liv., 147-150, 1903.

A man, aged 35, was operated on for right inguinal hernia of five years' standing. "On cutting through the aponeurosis of the external oblique muscle an opaque, whitish swelling was exposed." This was found to be a closed sac, not communicating with the abdominal cavity. and was adherent to surrounding structures. There was no hernial sac existing, but there was a considerable gap in the muscular wall of the abdomen between the arciform fibers and conjoined tendons and Poupart's ligament below.

The pathological report was that the tumor was a dermoid cyst. It measured two and three-quarters by one inch.

No. 3. Guinard and Cambessedes: Kyste dermoid du trajet inguinal. Lancette franc. (Gaz. d. hôp.) lxxxii, 262-263, 1909.

A young man, aged 24, came to clinic desiring to be operated on for a "right inguinal hernia with orchi-epididymitis and hydrocele." This diagnosis had been made in the army from which he was rejected on that account.

On operation by Guinard, after incision of the anterior wall of the inguinal canal, as in the first stages of the radical operation for inguinal hernia, he isolated a sac, which he proceeded to extract without opening. The tumor was fluctuant, but pasty to the touch. Section showed a dermoid cyst containing sebaceous matter and typical hairs. The authors say, "If the situations in which dermoid cysts have been found are very numerous the inguinal canal has never been given as a region of choice."

No. 4. The authors quote an analogous case reported by Coville of Orleans. This was also a man presenting himself with a hernia, as stated, and this was apparently not to be doubted. The case was absolutely identical with the above.

In these cases, the dermoid cyst of the inguinal canal simulated a hernial condition of the canal. The author considers that such cysts originate from remnants of the Wolffian bodies.

I am not reporting these cases as of great practical value to the surgeon, but, rather, as an anatomical curiosities and for the purpose of putting so rare a condition on record.

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